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A Marriage that will Last Forever
UNITED STATES ARMY
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PROFESSIONAL BULLETIN

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Cover: **This month's issue covers historical events relating to aviation from 530 A.D. to the present. The AirLand Battle concept used by General Belisarius provides insight into today's Army Aviation AirLand Battle doctrine. "Infantry and Army Aviation—A Marriage That Will Last Forever" begins on page 2 and emphasizes the joint training needed to ensure this union will last forever. Cover art by SSG Bob Rosenburgh.**

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Major General Ellis D. Parker
Chief, Army Aviation Branch

Manpower and Personnel Integration

YOU MAY HAVE heard the acronym MANPRINT in a recent conversation or meeting but did not know the meaning and did not ask for fear of appearing ignorant. Be assured, that is a widespread feeling on the subject of MANPRINT. The purpose of this article is to increase your knowledge of the program and tell how you, as users, can contribute to its success.

MANPRINT, as defined technically, is manpower and personnel integration; however, this technical definition does not fully define MANPRINT. An explanatory definition of MANPRINT is the integration of manpower, personnel, training, human factors engineering, system safety and health hazards assessment during the materiel development and acquisition process.

A further explanation of the six domains, mentioned above, will assist you in understanding MANPRINT.

- Manpower is available personnel strength expressed in numbers that is required by the Army.
- Personnel is the appropriate number of qualified people, in terms of specific skills, experiences and other human characteristics needed to use, operate, maintain and support Army systems.
- Training is the process that prepares soldiers to perform jobs.
- Human factors engineering is the design, development, evaluation and deployment of manned systems that are operable, maintainable and supportable.
- System safety is the optimum degree of safety features of a system within the bounds of operational effectiveness, time and cost.
- Health hazards assessment is the application of biomedical knowledge and principles to identify, evaluate and control risks to the health and effectiveness of personnel who test, use or service Army systems.

A change in one of these domains will most probably create a change in one or more of the five remaining domains.

MANPRINT is designed to be initiated with the introduction of the acquisition of a new system.

The earlier MANPRINT enters the acquisition process, the sooner the combat, materiel and training developers can affect the design of a new system.

Part of the acquisition process is an analysis of the predecessor system for lessons learned. This is one of many occasions when the user in the field has the opportunity to influence the design of a new system through MANPRINT. Other occasions may present themselves via surveys, questionnaires and interviews. In addition, a user may have the opportunity to attend a MANPRINT joint working group as a subject matter expert or serve in the same capacity on a source selection evaluation board. Regardless of the occasion that you encounter, please take the opportunity to help ensure that Army Aviation procures systems that complement the man, versus trying to find a man to fit the system.

The central goal of MANPRINT is to influence design so that human performance and reliability are reflected in total system performance.

Can this soldier
with this training
perform these tasks
to these standards
under these conditions
with this equipment?

INFANTRY and ARMY AVIATION

A MARRIAGE THAT WILL LAST FOREVER

Colonel Eugene H. Grayson Jr. (Retired)
Radford, VA

The opinions expressed in this article are those of the author and do not necessarily reflect the views of any Department of Defense agency.

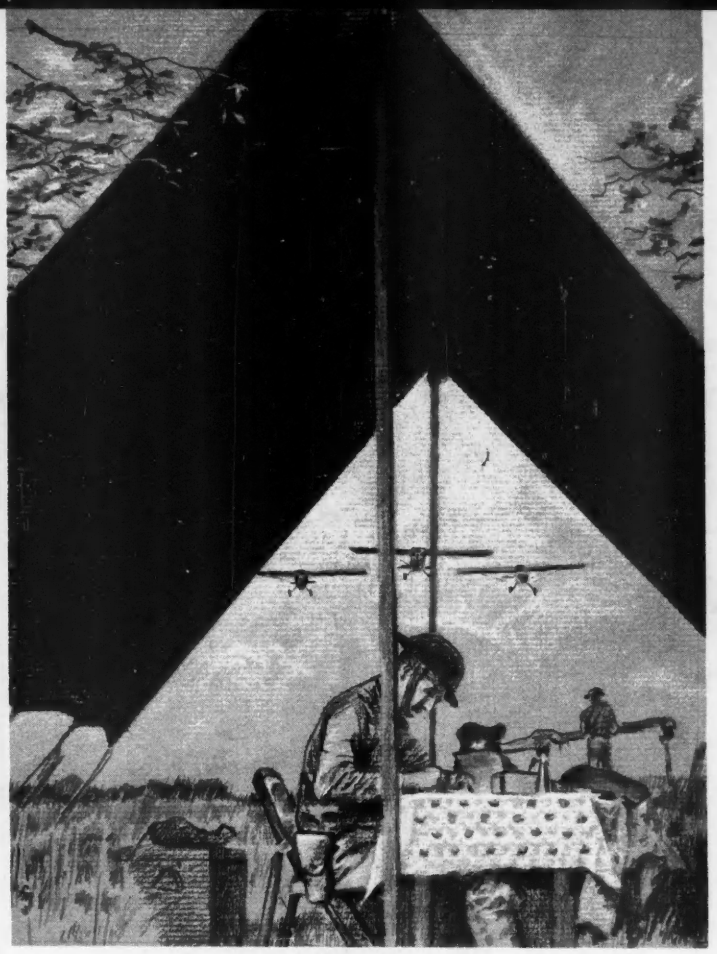
The formal marriage took place at Ft. Bragg, NC, during the 1961-62 "Howze Board." The honeymoon was spent at Ft. Benning, GA, during 1963-65, where the marriage grew stronger during the 11th Air Assault Division era. Moreover, during the following years in Vietnam, the marriage matured, and infantry and aviation were inseparable. However, following Vietnam, the marriage became somewhat strained as other suitors made a serious play for Army Aviation, and some, rather convincingly, tried to move in and convince Army Aviation that the infantry was old and outdated, and that a marriage to one of them would offer more excitement and a faster moving life style. Fortunately, the marriage survived this crisis, and today the opportunities are present for the infantry-aviation union to grow and last forever.

UNITED STATES ARMY Infantry and Army Aviation! The words are practically synonymous as a result of doctrinal developments, tactics, techniques and procedures that have been enhanced during the past 25 years.

For you "older infantry troops" of the Vietnam era, it is easy to recall that, when you went into battle, you were lifted in by aviation; escorted en route by aviation; your suppression fires were provided by aviation; you were resupplied by aviation; your wounded were picked up by aviation; your "on-station artillery" was provided by aviation; and, when your battle was won, you were returned back to home base by aviation. For you Vietnam aviators, you can clearly recall that for 24 hours a day, 7 days a week, you lived with, ate with, supported and fought with infantrymen from 1962 until the U.S. withdrawal from Vietnam some 10 years later.

What we now need to ask ourselves is, "Will tomorrow's battlefield be any different as far as the infantry-aviation relationship?" You might say, "Now just a minute, things have changed since the old days. We are not merely infantry today—we are mechanized infantry; ranger infantry; airborne infantry; air assault infantry; motorized infantry; Bradley infantry; and, with the arrival of our most recent unit, light infantry!" My response to this statement is, "so what!" Infantry and aviation will still fight tomorrow's war together and, in fact, will develop a closer relationship than ever before.

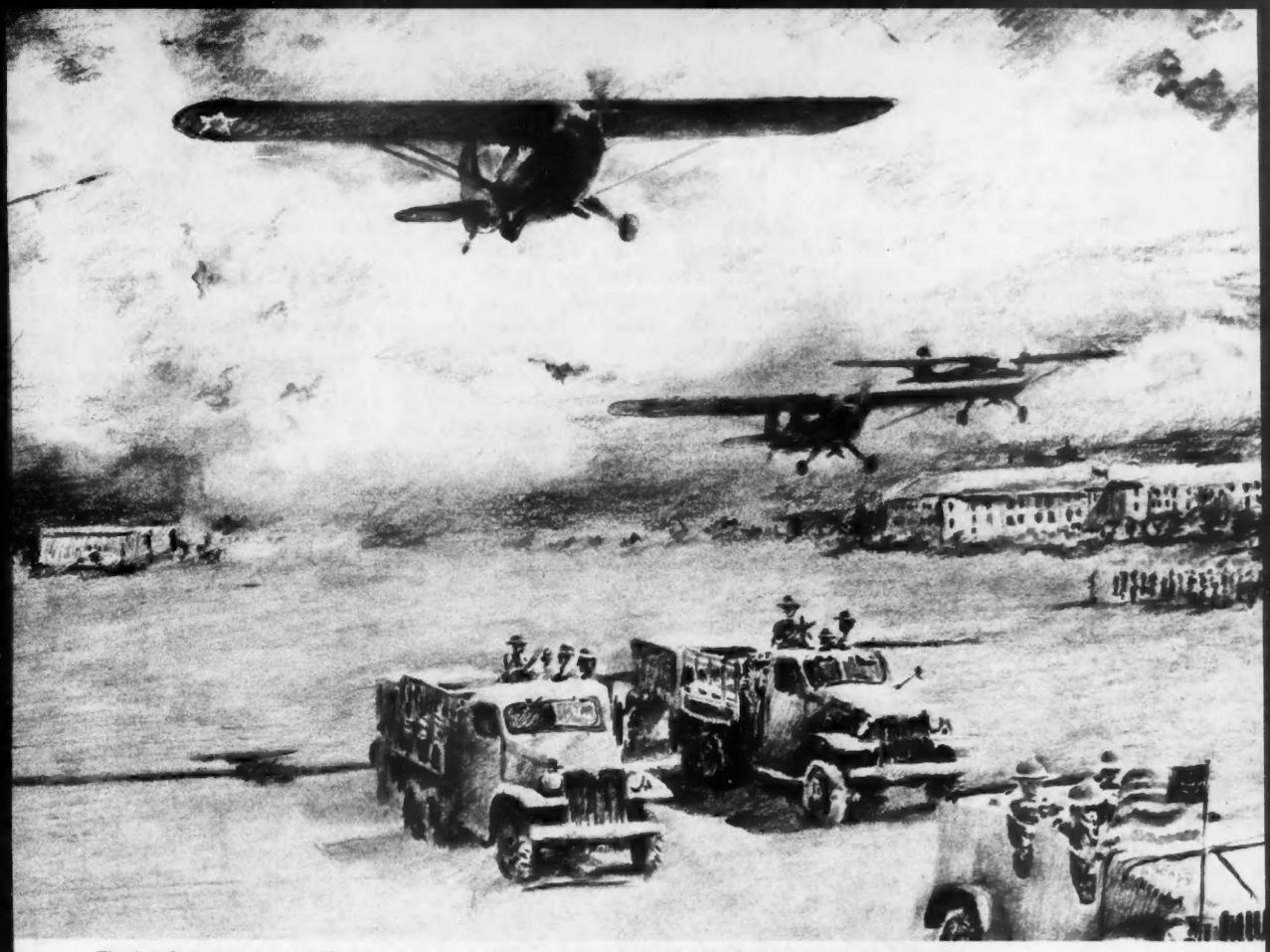
For those of you who are mechanized infantry troops, when was the last time your mechanized unit and an assault helicopter unit hooked up to air assault dismounted infantry troops across an unfordable river to secure a bridgehead? It has been done on occasion and with spectacular results. Dig out the Return of Forces to Germany (REFORGER) 1979 Afteraction Report. Note the outstanding success enjoyed by the 1st Battalion, 6th Infantry (M), 1st Armored Division. Imagine the armored division's surprise and shock, as it attempted to seal off the bridgehead, when discovering infantrymen on its side of the river task organized with attack helicopters, killing tanks and other armored vehicles. Why aren't infantry and aviation constantly employed together? The opportunity is there during every REFORGER. Yet Blue and Red forces slug it out with tanks year after year at the river line.



Although plagued by obstacles down through the years, Infantry and Army Aviation have stood the test of time and are now inseparable.

For you mechanized infantrymen, think about it. Draw together, very rapidly, the air assault assets, the attack helicopters integrated for air assault security and landing zone (LZ) suppression and, all working together, seal off the bridgehead against enemy armor forces. Aeroscouts deploy with the formation and provide infantry with its eyes and ears. Plus aeroscouts can augment airborne forward air controllers, if close air support is needed, and move infantry tank killer teams by air into key terrain overlooking the crossing site. Imagine your CH-47 Chinook support lifting light artillery, or even towed 155s, and air defense systems in to support your defense. If you really want to let your imagination go, imagine lifting in combat engineers with bridging equipment right behind the assaulting infantry!

The bottom line is that mechanized infantrymen need to spend time working with aviation units. The question



The L-4 Cub played a significant role in the history of Army Aviation by leading the way as the Army's first and most prominent fixed wing observation aircraft.

is, "Is it being done in your unit and, if so, are you getting the word out on what works, what doesn't work, etc., for others to benefit?" Now that the aviation brigades are coming onboard, the opportunity to train together is better than ever, so let's take advantage of it.

When we talk about Ranger Infantry and Army Aviation, we could fill a book with the multitude of missions that can be accomplished. What about deep operations in which ranger infantry troops are heliborne lifted into the enemy's rear to accomplish a myriad of special missions? When was the last time a ranger unit was picked up at Ft. Benning during the hours of darkness, flown at a low level to Ft. Stewart, GA, and air assaulted into clandestine LZs, marked by ranger pathfinders, to destroy missile sites, command posts, logistical bases and blow bridges? Has it been done since 1963-64 when the 11th Air Assault Division ran similar missions routinely? You ranger commanders, let your imagination run for a minute. Imagine how effective your unit and Army Aviation can be in almost every hostile scenario, from the low-intensity to the high-intensity battlefield. However, *if you don't train together, you can't fight together.* So, what are you doing about it?

There is no point in discussing the lashup between air assault infantry and aviation because the 101st Airborne Division (Air Assault) does all of those infantry-aviation missions in a splendid manner. But what about the rest of you infantrymen? Do you read the lessons learned and afteraction reports from Bright Star, Team Spirit, Gallant Knight, etc.? After all, every Army infantry unit should be able to mount an air assault operation. However, if you don't train to do it, will it be successful?

What about you Bradley infantrymen? Do your brigade-level units ever train together with aeroscouts and attack helicopters during a defensive scenario? Do you ever use your aeroscouts as your eyes and ears to find out what's out front and where? Do you ever use your scouts for eyes and ears during a fast moving attack when you and your armor counterparts are head-

ing deep? If not, do you ever stop and think what the repercussions might be if you don't? Ask the Israeli commanders who conducted armored and mechanized attacks into the Sinai in 1973, what happens when you do not have eyes and ears out in front of you? Do you ever work together with aeroscouts finding targets for your supporting fires? Do you dismounted infantrymen know how to talk to attack helicopters? Do you think it might be a good idea to start training together?

What about you light infantrymen? Do you train with your aviation counterparts? Can you think of a better relationship anywhere in the world than light infantrymen and Army Aviation fighting together? Think of slogging along, fighting your way up mountainous terrain in Korea, Southwest Asia, etc., and read about how your counterparts from yesteryear fought up and down the mountains in Italy. Then think about mobility! Think about aviation units lifting your units onto mountain tops, into narrow passes; lifting your supporting lightweight artillery right along with you; moving your tank killer teams wherever you want them to go; moving your mine laying teams into strategic areas; augmenting your antitank weapons; providing you with radio relay; moving your supplies; and on and on! Has any infantry unit ever conducted mountainous operations with aviation units east of the Mississippi River since 1962 when, during the Howze Board, routine operations were done in the "Smokies" and the Shenandoah Valley? If not, why?

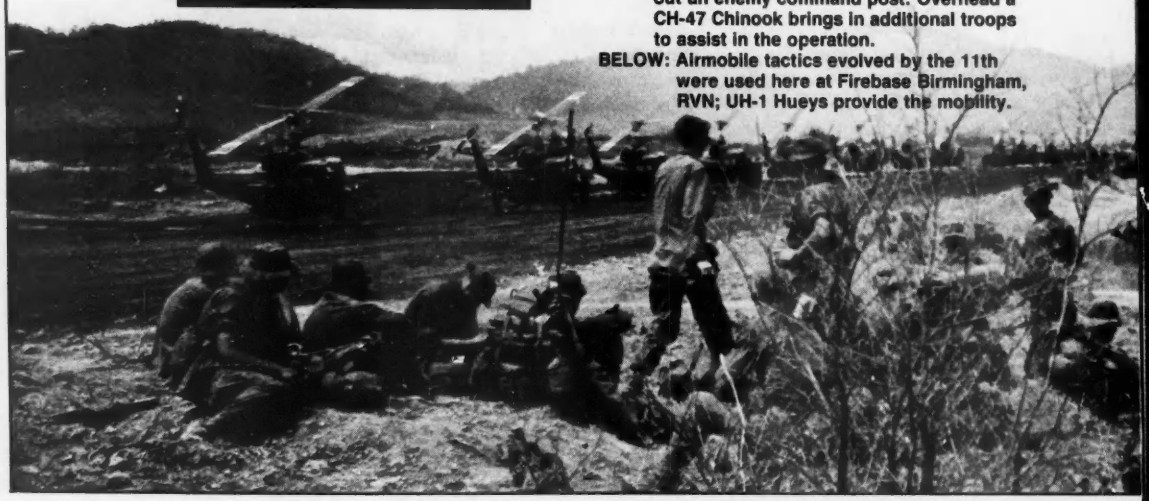
The bottom line is that whatever kind of infantry you may be, and wherever you may fight, you will have aviation units fighting right with you. However, what we are doing, in most cases, is reinventing the wheel in our infantry-aviation training. This costs dollars and

photo by SSG Howard C. Breedlove

ABOVE: With the airmobile division's use of helicopters, entire infantry battalions were transported into, around and out of the battle area.

LEFT: On the ground troops maneuver to flush out an enemy command post. Overhead a CH-47 Chinook brings in additional troops to assist in the operation.

BELOW: Airmobile tactics evolved by the 11th were used here at Firebase Birmingham, RVN; UH-1 Hueys provide the mobility.



flying hours, and it wastes training time! Go back and extract lessons learned from the Howze Board, 11th Air Assault Division and combat after-action reports from Vietnam. Find out how aviation units fight in annual REFORGER exercises; find out how light infantry and aviation operated together during the Bright Star exercises, and start working together in your unit.

Often Times We Get Hung Up on Tanks Fighting Tanks

Infantry troops on tomorrow's battlefields will continue to play a decisive role. In a protracted war in Europe, the role of infantry, regardless of type, will be critical. In restrictive terrain, when Soviet armor lacks vast space for maneuver warfare, infantrymen may plan the decisive role. Take a look at a detailed map of West Germany. You may be surprised to find that more than 60 percent is good infantry terrain. Forests, built-up urban areas, criss-crossing highway systems, numerous water obstacles and restrictive valleys dominate the countryside. If that doesn't cause you to stop and reflect, think about the 100+ Warsaw Pact divisions that are not armor divisions. If you are still unconvinced, read about the year-long defensive struggle conducted by the Germans during 1944 when infantry divisions fought extremely successful actions against tank units until they were finally overcome by sheer numbers. For those of you who do not like old lessons from the past, look up and learn how Egyptian infantrymen destroyed entire Israeli tank units during the first week of the 1973 war. To carry this analysis one step further, ask the Israeli commanders who spearheaded the assault into Lebanon what killed the majority of T-64 and T-72 tanks. The answer is the infantry fired TOW missile!

photo by SP5 Lawrence J. Sullivan

We should start thinking about and planning for infantry and aviation tactics, techniques and procedures on this high-intensity battlefield in Europe or in Southwest Asia. Train together at Ft. Hood, TX; Ft. Stewart; the National Training Center; and wherever you have the space to maneuver together.

In Southwest Asia, a large part of the terrain is infantryman's country where armor formations can be ambushed easily before finding maneuver room. Korea is, unquestionably, infantry country. North Korean armor will not enjoy the impunity of the 2.36-inch bazooka should they cross the parallel again.

In tomorrow's war, wherever it may be fought, infantry and aviation will team up and fight together. In Europe, infantry and aviation may be air assaulting an infantry brigade across a river to secure a bridgehead; a ranger unit employed deep beyond the forward line of own troops to delay, disrupt and destroy certain targets; lifting infantry tank killer teams throughout the battlefield to seize and hold a key intersection for armor forces to pass though; or AH-64 Apaches and infantrymen killing tanks in urban areas. In Southwest Asia, it may involve air assaulting infantry 100 kilometers deep to secure key mountain passes; or night raids to ambush enemy march columns. In a low-intensity environment, infantry and aviation will team up, 24 hours a day, and conduct every imaginable combat mission. In Korea, it may include moving a light infantry brigade over a mountain range to block second echelon forces from passing through a key road junction. The list goes on and on.

So what's the point of this litany on infantry and aviation? Well, the point is, what are you doing in your infantry unit to train with whatever aviation unit is nearby? Ft. Benning and Ft. Rucker, AL, are pretty close together, but are the two closely linked together in working doctrinal issues, tactics, techniques and procedures? Are the two proponent schools beating the bushes out in the divisions and brigades to ensure joint training is taking place? Take advantage of the lessons from the 101st Airborne Division (Air Assault). The aviation-infantry team at Ft. Campbell, KY, is inseparable!

If you don't start training together, one day, let's say during a REFORGER exercise, the word may come down to conduct an air assault operation with a dismounted mechanized infantry battalion to secure a key terrain feature. If you haven't trained together, several hours later, when both units are trying to put the operation together, the critical time will have slipped away and it will be too late!

The infantry-aviation marriage heads into its 30th year. At platoon, company, battalion and brigade level, let's ensure the close relationship continues and the capability of infantry, other combined arms members and aviation to fight together on tomorrow's battlefield, wherever it may be, is perfected.

A HISTORICAL PRECEDENT: SUPERIOR INFERIORITY

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Captain Brogna was assigned to Aviation Officer Advanced Course 86-4, Fort Rucker, when he wrote this article.

CONSIDER THE following scenario. The area of operations covers Europe, North Africa and Southwest Asia. You engage an enemy who outnumbers your forces by a 20:1 margin. You rely on a slight technological advantage in weaponry over your opponents, and you plan to capitalize on your superior mobility....

Surely this is a scenario for the U.S. Army but, in 530 A.D., it was a reality faced by the brilliant Byzantine General Belisarius. Belisarius met this challenge successfully on many occasions. As a result, a short study of his campaigns and methods provides further insight into our own AirLand Battle doctrine and Army Aviation.

Belisarius (505 to 565 A.D.) was the finest tactician (not strategist, since the Emperor decided strategic policy) of the Byzantine Empire. Strong, patient, industrious, careful with the lives of his men and sparing with those he conquered, the 25-year-old Belisarius was chosen by the Emperor Justinian, "the Emperor who never sleeps," to protect the Byzantine Empire and restore the Western Roman Empire. Belisarius accomplished these two tasks using both remarkably slim resources and a basically defensive strategy. This is extraordinary since the Byzantines' strongest asset was their cavalry (known as "Cataphract").

These cavalrymen (made up of Byzantines, Huns, mercenaries and conquered horsemen) were armed

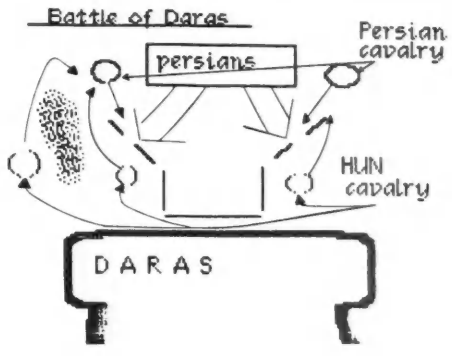
In 530 A.D. General Belisarius applied the tenets of AirLand Battle to turn his weakness of inferior numbers into superior synchronization of forces and win on the battlefield. Those tactics that won victories on the battlefield so long ago can provide insight into the AirLand Battle doctrine and Army Aviation on today's battlefield.

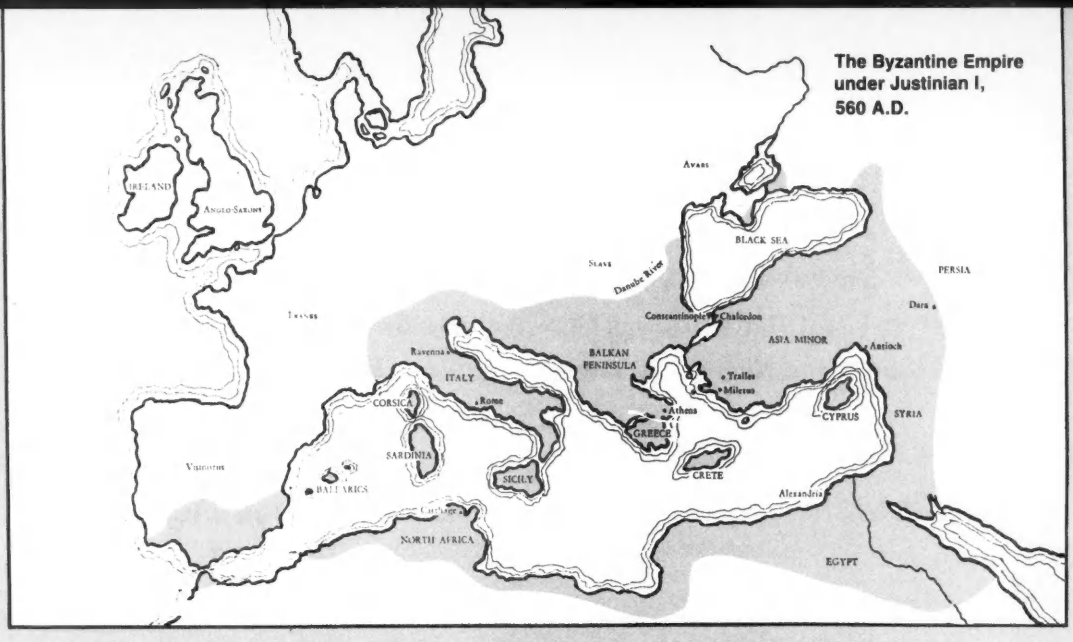
not only with lance and sword, but also with the superior Byzantine bow. They wore armor that gave protection against most of their foes' arrows. Belisarius' basic tactics were to force the enemy to deploy and attack, and then to have his Cataphract use their bows on an advancing foe while at a stand-off range, thereby wearing down the enemy without being subjected to return fire; and to capitalize on the superior mobility of the Cataphract by audaciously attacking the enemy's weaknesses. Accordingly, we see that the Cataphract combined both mobile shock-power and mobile firepower. *(These were the forerunners of our armor and aviation.)*

Belisarius' infantry served as static center, around which the cavalry could maneuver, and as a demonstration force that would draw the enemy into the attack. (The Byzantine infantry was held in low esteem by many enemies. Belisarius used that perspective to his advantage on many occasions.)

Belisarius' first major battle was the Battle of Daras in 530 (see map). A Persian force of some 40,000 highly trained infantrymen and cavalrymen invaded the Byzantine Empire. Belisarius, who had less than 20,000 troops, met them at the fortress Daras. Instead of occupying the city and having the Persians lay siege, Belisarius decided to risk battle. Belisarius deployed his infantry in a 'U' formation, with the light cavalry extending out and the Hun cavalry as pivots. Behind a hill, Belisarius hid a detachment of Hun cavalry for raids into the Persians' rear area when the opportunity arose. The Persians, believing the U formation to be a trap to draw them into the center and then have the wings close in on them—which is what Belisarius wanted them to believe—split their forces (as Belisarius planned) and attempted to fight down each side independently. On the left flank, the Hun cavalry in the pivotal position moved out and attacked the Persians' flank, while the detachment behind the hill made a deep assault into the enemy's rear. As a result, the Persian force on the left side broke and ran, which allowed Belisarius to mass his forces on the right side and easily win the battle.

Belisarius had turned his weakness of inferior numbers into a strength of greater agility and easier





SUPERIOR INFERIORITY

command and control, allowing superior synchronization of forces. He also used tactical deception to trick the Persians to engage him in the way he wanted. Furthermore, he used a psychological operation on the Persians. The night before the battle, he sent the Persian commander a letter requesting peace. In the letter he stated, "The best general is the one who can bring about peace from war." The Persian commander perceived this message as a sign of fear and, therefore, less careful with his plans, was more easily drawn into the attack.

Justinian next sent Belisarius to North Africa to subdue the Vandals, who were using ancient Carthage as their capital. For this mission, Belisarius was given 5,000 cavalrymen and 10,000 infantrymen. The Vandal army numbered more than 100,000.

After setting up a logistical support base in Sicily, the Byzantine force landed down the coast from Carthage. Belisarius' plan was to make a rapid advance up the coast, while sending his navy forward immediately to threaten Carthage. Furthermore, Belisarius began a successful campaign to win over the local population. (Justinian made a proclamation that his army came not to make war on the populace but solely on their king, Gelimer.) Gelimer split his huge forces, leaving some behind to defend Carthage and moving the majority out to intercept the Byzantine army at Ad Decimum (10 miles from Carthage).

Gelimer's plan was to split his forces into three different simultaneous attacks. The first would hit the front of Belisarius' column. The second would come from the flank to split the column in the middle, while the final would swing around and attack the rear. (Since the Byzantines were marching along the coast, their remaining side was the Mediterranean.) However, Gelimer failed to consider the rapid pace of the highly mobile Byzantines and the fact that he lacked the ability to synchronize his complex plan. (The historian Procopius, who was marching with Belisarius, stated that, if Gelimer's idea was carried out as planned, there was no doubt that the Byzantines would have been destroyed.) As a result, each attack occurred at different times, allowing Belisarius to mass his forces and react to each engagement with his entire force.

Before the battle, Belisarius addressed his troops: "Now as for the host of the Vandals, let no one of you consider them. For not by numbers of men, nor by measure of body, but by valor of the soul is war decided." The day went to Belisarius. After further fighting Carthage was taken, and the Vandals vanquished.

Using North Africa as a supply base, Justinian ordered Belisarius to reclaim Italy from the Ostrogoths. Justinian made a political deal with the Franks, which sent them invading northern Italy as a diversion and causing the Goths to commit forces to their northern frontier.

In May 536 Belisarius' Army, numbering about 12,000 men, landed near Naples and conquered that city by filtering troops through an unused aqueduct, while making various diversionary attacks around the city. The Gothic king set out from Rome with an army of 150,000 to destroy Belisarius; however, Belisarius was able to slip past this force.

On 10 December 536, Pope Silverius opened the city gates to Belisarius, who was cheerfully greeted by the Romans. The Goths turned and laid siege to Rome; however, they were unable to penetrate the city's defenses. Meanwhile, Belisarius began a campaign to capture the Goths' various supply and communications routes and centers. He accomplished this by sending out his cavalry in highly mobile detachments that could move throughout Italy quickly, yet with sufficient force to conquer key areas. Capture of terrain was unimportant. Destruction of the enemy by concentrating on his weaknesses (logistics and communications) was the objective. Finally, after a year's siege, the Goths were forced to lift their siege, retreat and recapture their lost cities. When the Gothic army was half-way across the Mulvian bridge, Belisarius launched an attack against the enemy's rear from which it suffered heavily.

For the next 2 years, Belisarius conducted highly mobile warfare throughout Italy. He sent numerous cavalry detachments throughout the countryside to pin enemy forces down, while the remaining Byzantines massed on a particular objective. This tactic resulted in the capturing of the Goth king in 540 and the addition of Italy to the Byzantine Empire.

In 540 the Persians again invaded the Empire, this time with a force of 200,000 men with the goal of conquering Jerusalem. Justinian recalled Belisarius and gave his an army of about 10,000 to intercept the Persians. Belisarius correctly discerned that the only route the Persians could take was down the Euphrates. Moving the Byzantine forces to the point where the Persians would be most vulnerable during their march, Belisarius began one of the greatest deceptions in history.

Byzantine forces made various movements along the Persians flanks, giving the impression of a larger force. The Persian commander, concerned over size of this unknown force, sent an envoy to Belisarius' camp under the guise of peace. Actually he wanted to determine the size of Belisarius' army. Belisarius guessed this and staged a vast military play for the envoy. Extra tents were erected. All troops were massed on the envoy's route to give the Persian commander the impression he was only seeing part of a great army. Troops were told to move about constantly and to act cheerful and confident. Belisarius met the envoy in a light-hearted and carefree mood. So impressed was the Persian commander with the envoy's report and the various Byzantine cavalry movements along the Persian flank, that he beat a hasty retreat back to Persia.

Belisarius went on to further conquests throughout the Empire. While in retirement in 559, he saved Constantinople from a Hun invasion—the city was void of troops—by rallying 300 of his retired veterans on commandeered circus horses and ambushing the Hun flank. His tactics preserved the Empire for another 900 years.

Belisarius never directly attacked his enemies; rather, he applied his strengths to his opponent's weaknesses. Belisarius used his defense to tempt the opponent to attack in a way that would suit his tactics, which allowed him to get his enemy off balance so he could use his Cataphract to the greatest advantage. He was a master of deception and psychological warfare. His applications of the tenets of AirLand Battle (initiative, agility, depth and synchronization) led him to constant victory.

Belisarius is one of history's great captains. He was a master tactician from whom we can still learn. His victories show that numerical superiority can be tactical inferiority.

U.S. ARMY SAFETY CENTER

RISK MANAGEMENT

Flying the Mission Anyway—The Best Way

ARMY AVIATORS strap themselves into aircraft designed to withstand the stresses of flight, speed and altitude. Even so, aviators themselves were designed to walk upright at only about 4 miles an hour. With this built-in conflict between man and machine comes the need for a built-in process to identify, minimize and reconcile risks with essential mission needs.

The Army's risk management approach is a concept for doing just that. Risk management is a handy tool for balancing the inherent risks of hard, tough, realistic training against the safety of troops and equipment. It makes possible a balance that allows the blending of the two for the best mission results possible.

The increasingly demanding training required to produce combat-ready soldiers severely tests the abilities of Army leaders to keep their troops both safe and ready. The greater mission carries with it greater risks. The evolution of the Army Aviation mission illustrates this point.

Twenty years ago, a low level of risk was associated with the aviation mission. At that time, for example, aircraft were comparatively simplistic. Aviators were flying observation missions at altitude under visual flight rules conditions. Then the mission was expanded to include tactical instrument flying in weather. This expansion of the mission profile produced a corresponding sharp increase in the level of inherent risks associated with mission demands. As pilots gained proficiency in tactical instrument flying, the risk factor leveled off. However, the risk level remained at a higher level than before.

The mission was then expanded by the tactical requirement for nap-of-the-earth flying. Again, the level of training risks rose sharply. It rose in direct proportion to the increase in the level of difficulty of the mission.

The mission has now been expanded by the requirement to fly with night vision devices. This requirement greatly increases demands placed on aircrews and equipment; it produces a corresponding increase in training risks. However, the inherent risks associated with night vision goggles flying continue to increase rather than level off.

The aviation mission has become increasingly more demanding. The overall increase in level of risk has put greater demands on leaders—risk managers—to minimize the risks inherent in an operation. Leaders must now reconcile inherent risks with essential mission needs.

"Risk management" is the term used to describe the systematic process for doing this. The risk management process begins by clearly defining mission requirements. Then acceptable risk factors are established. Risks associated with mission operations are identified and weighed against the benefit to be gained.

The conflict between safety and training has, at times, become acute. It did so when fog rolled across a valley

where a light rain was already falling on troops involved in a training exercise. Two UH-60 Black Hawks, involved in tactical support missions, were transporting 12 soldiers from one location to another. Visibility was less than one-quarter of a mile. At the head of a valley pass, the two aircraft encountered a patch of fog. One pilot chose to proceed through the fog and up the valley; he expected to break out of the overcast. The other pilot, assessing the risk as too high, turned around and flew out of the valley. The lead aircraft continued to fly; it hit trees 107 feet above the valley floor on rising terrain. It crashed, killing the crewchief and three passengers. The other occupants were critically injured. A multimillion dollar piece of equipment was destroyed.

Risk management, when used in the mission planning stage, is designed to uncover weaknesses in operations. Events leading up to a less dramatic situation were no less dangerous because of lack of planning and lack of mission analysis.

A UH-1 Huey had launched shortly after midnight to support rescue efforts brought about by massive flooding. At some point in the mission, the main rotor blades struck an unknown object, damaging both blades. The damage was discovered during the postflight inspection.

A mission analysis based on the risk management approach would have shown several weaknesses in the rescue mission: a crew that was inexperienced in night flying, with neither pilot nor copilot having recent night training or flying experience; lack of crew selection criteria for emergency search and rescue operations; lack of a written standing operating procedure on the rescue hoist; and an unfamiliar landing zone.

These weaknesses combined to make this a risky operation. A risk assessment before the mission would have quickly identified the risks. It should have enabled the commander to minimize the risks or control them.

Controlling risks is done very simply by not accepting preventable risks. Preventable risks can be reduced or eliminated by setting operational parameters within the constraints of existing resources and technology. Risks can be prevented without unacceptable impediment of the mission. Operational parameters can be tailored by controlling the variables affecting the mission; for example, illumination levels, time standards and weather criteria. Going beyond these parameters changes the risk level.

Risk managers must first identify the risk. Next, they must evaluate and quantify the risk. Then they must reduce or eliminate the risk. This involves risk decision making; that is, deciding which risk they can live with and which they can't. In risk decision followup, risks are double-checked and the benefits are projected.

When the mission requirements are within an acceptable risk level and within established operational parameters, the risk factor will be low. Adding man, machine or environmental limits will increase the risk factor correspondingly.

Apply this concept to a VIP (very important people) fixed wing flight detachment. The unit mission generally is in the low-risk category. Most risks associated with the mission are preventable.

Apply the same process to an attack helicopter company in Germany. Based on mission demands, the level of risk is far greater.

An element of risk may be unavoidable in accomplishing the training mission. If so, commanders must set realistic operational parameters that ensure overall mission benefits clearly are warranted and clearly exceed the overall potential cost of the risk itself.

Based on mission requirements, acceptable risk levels are established. As unit proficiency increases because of training or improvements in equipment, operations within the area of acceptable risk are expanded. Sustained training and improved technology provide an improved balance of risks. This improved capability will then allow the unit to expand operations into a higher risk zone. This zone is beyond the operational parameters previously set for normal operations. This zone of increased risk is knowingly and carefully penetrated for a clearly predetermined training benefit essential to mission accomplishment. The further into the zone, the greater the risk, which in turn demands a higher level of risk management decision, more careful planning and more stringent consideration of any controllable variables.

The level of the decision maker should correspond to the level of the risk. The greater the risk, the more senior the final decision maker should be. When in the high risk zone, everyone from commander to crewchief must be aware of the risk implications. By-the-book disciplined operations are mandatory. All controllable risk variables must be controlled. At the same time, this does not mean low-risk operations are unsupervised. Nor does it mean high-risk operations shouldn't be carried out. Managing risks doesn't include not doing the job; it does include identifying the risks and setting the parameters under which the job will be done.

A traffic light signals green for go, yellow for caution and red for stop. Just so does the risk management concept signal commanders and other leaders when risks to the mission need to be controlled or eliminated. The risk management approach gives leaders increased capability to integrate safety into daily operations and determine how man and machine can best accomplish their mission.

PEARL'S

Personal Equipment And Rescue/survival Lowdown

Survival Radios and Test Sets

Army Aviation units that have been receiving AN/PRC-90-2 survival radios or TS-24B test sets without technical manuals (TMs) should contact Mr. Wayne Dickerson, Communications and Electronics Command, AUTOVON 992-1039, for assistance in obtaining manuals for these items.

Medical Materiel

Activities with the following medical materiel on hand should send all suspended quantities collect to Private Formulations, Inc., ATTN: Return of Goods Department, 460 Plainfield Avenue, Edison, NJ 08818: National stock number (NSN) 6505-00-063-5631, Aspirin, Delayed Release Tablets, USP; 324 Grams 10,000S; Manufacturer Private Formulations, Inc. (all lots).

Note: Include a letter with the shipment requesting credit for the materiel returned. The letter should cite the quantity being returned and an in-the-clear return address. Standard Army Intermediate Level Supply ABX 88Q0741 applies. The point of contact (POC) at Ft. Detrick, MD, is SGMMA-MMQC-0811, 251315Z FEB 88.

Aircraft Seat Belts

We have been receiving inquiries on the "shovel" type latch (MS 3488). Many of these latches have an extension plate attached to allow proper clearance in accordance with TM 55-1500-204-25/1, change 31, paragraph 3-311A and figure 3-112B. This extension plate *will not* be removed from the MS 3488 latch. New production seat belts with the MS 3488 latch have sufficient clearance. They do not require the extension plate because the drawing was changed to give the proper angle eliminating the need for the extension plate. Refer to your appropriate TM for measurement information; see TM 55-1500-204-25/1. The POC is Mr. Jim Dittmer, AMCPM-ALSE, AUTOVON 693-3573. The alternate is Mr. Boone Hopkins in the same office.

Survival Vest SRU-21/P and Kits

This article repeats a previous article on subject vests and kits. The net, multipurpose, NSN 7465-00-300-2138, has been removed from the SRU-21/P vest and transferred to each of the standard individual survival kits, NSNs 1680-00-973-1863, overwater; 1680-00-973-1862, cold climate; 1680-00-973-1861, hot climate kits. The net, multiplace, is not considered short-term survival equipment. Therefore, to reduce the bulk of the survival vest, the more appropriate location for the multipurpose net was determined to be in the individual kits. Since the adoption of the new survival matches, NSN 9920-01-154-7199, a requirement no longer exists to include match box, NSN 8465-00-265-4925, as a survival kit or vest component. These changes may be accomplished during the next scheduled inspection. These changes will be incorporated in the next change to TM 1680-317-23&P. The POC for this action is Mr. Boone Hopkins, AMCPM-ALSE-L, AUTOVON 693-3573.

Oxygen Mask Regulator

Reports from oxygen users have reported that the regulators on the MBU-12/P have been "freezing" during use. We are checking into this problem, but believe it may be caused by using medical oxygen. You are undoubtedly aware that medical oxygen has a high concentration of moisture, which could be the root problem. We will provide you more information as to cause factors and necessary "fixes."

Updated Flyers' Clothing Information

We have several inquiries on flyers' clothing. The information below covers the questions:

Jacket, flyer's CWU-45/P, heavyweight.

Defense Personnel Support Center S9T is accepting funded requisitions for the jacket, flyer's, CWU-45/P, heavyweight, NSN 8415-00-310-1111 series. This jacket replaces the jacket, flyer's, N2B, heavyweight, NSN 8415-00-118-7569, -7573, -7574 and -7587 (small, medium, large and extra-large). The CWU-45/P, made of Nomex fabric, provides flame resistance; the N2B did not. The unit price of the jacket is $114.00, and the unit of issue is each (EA).

Note: The basis of issue for the jacket, CWU-45/P, is identical to that of the replaced jacket, N2B, found in common table of alllowances line item number L14978. The

CWU-45/P jacket, flyer's, is to be worn with the hood, flyer's, NSN 8415-01-167-7242 series, which is currently in the supply system. The unit price of the hood, flyer's, is $29.45, and the unit of issue is EA.

Jacket, Flyers	Size	Tariff per 1,000
8415-00-310-1111	S—(34-36)	151
1123	M—(38-40)	363
1133	L—(42-44)	325
1140	XL—(46-48)	161

NSNs, sizing and recommended tarrifs.

Jacket, Flyer's, Medium Weight (Nomex) and Jacket, CW, Aramid OG 106

The jacket, flyer's, medium weight (Nomex), NSNs 8415-00-221-8870 and 8415-00-217-7387(s), authorized to aviation personnel, is being phased out and is no longer being procured. Replacement item is jacket, cold weather, Aramid, OG-106, NSN 8415-01-074-9413(s). To determine authorized aviator requisitions, send hard copy requisitions (mailed) off-line to Commander, Defense Personnel Support Center, ATTN: DPSC-FOOB, 2800 S. 20th Street, Philadelphia, PA 19101-8419.

Note: A statement must be added to the remarks block of the requisition, indicating that the aviator requisition is authorized.

Now you can help us by letting us know what we can do for you. Don't be bashful, we'll help you all we can, but we can't help you if we aren't informed.

If you have a question about personal equipment or rescue/survival gear, write to PEARL'S, AMC product Management Office, ATTN: AMCPM-ALSE, 4300 Goodfellow Blvd., St. Louis, MO 63120-1798 or call AUTOVON 693-3573 or Commercial 314-263-3573.

Answers to THREAT QUIZ
from inside back cover

U.S. Army Class A Aviation Flight Mishaps

	Number	Flying Hours	Rate	Army Fatalities	Total Cost (in millions)
FY87 (through 15 May)	20	984,734	2.03	21	$46.6
FY88 (through 15 May)	17	1,041,824*	1.63	30	$46.6

*estimated

Soviet and U. S. Helicopter Industries and Tactics

Three dimensional maneuverability has been an integral part of land combat since World War II. By the time of the Korean War, technology and the economics of production had advanced enough to provide air movement of troops and supplies by helicopter for the first time. Since the maturation of the helicopter in that war, both the United States and the Soviet Union have amassed great fleets of military helicopters. Strangely, no similarity exists when comparing these fleets or their respective doctrines for employment of these fleets.

THIS ARTICLE addresses the differences between the United States and the Union of Soviet Socialist Republics in their processes of developing aircraft. The purpose of the investigation of these differences was to predict the continued parallel development or convergence of the two nations relative to helicopter doctrine and production. Available information was assembled on the histories of the development of helicopter industries in each nation. Fundamental differences, similarities and integrations were observed. These observations provide the basis for the prediction of future trends.

Development

Soviet helicopter industry and tactics are discussed first in this article. The Russians are legitimately recognized as world leaders in developing helicopter theory and technology. Although the concept of vertical flight is centuries old—early sketches date to 1483—the helicopter could not be built until a suitable engine was developed. In the early 1900s, the Soviets pioneered in developing experimental helicopters, assembling a prototype aircraft in 1907. However, the special conditions of the Russian Revolution resulted in the flight or exile from Russia of Soviet scientists. Therefore, Soviet development of helicopters did not materialize until after World War II. At the same time of the flight of Soviet scientists from Russia, high technological advances were being made in the United States. With the communist system well entrenched, the Soviets began to search for the technological superiority that had been lost to the West. For example, they established the Ministry of Aviation Industry to direct all research, design, development and testing of aircraft.

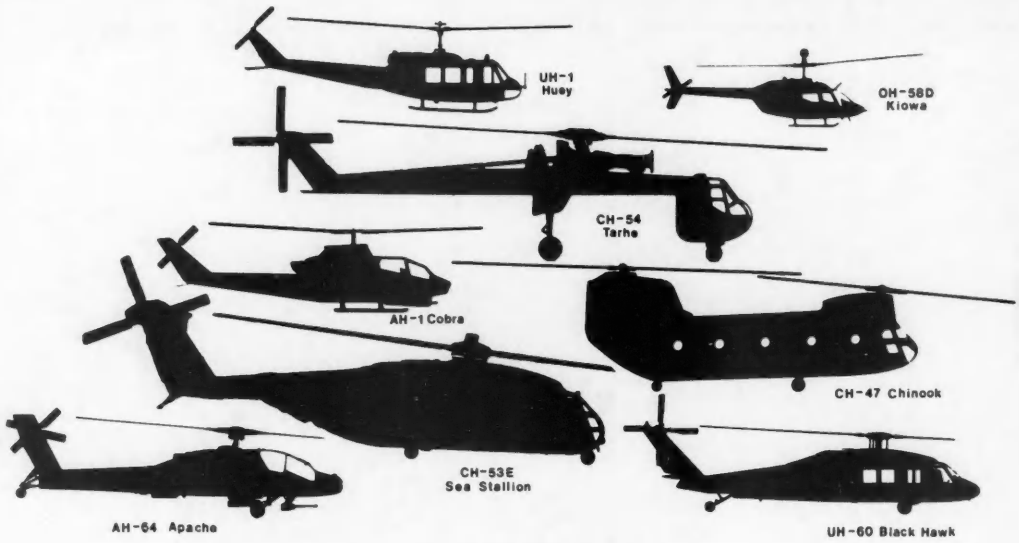
Russia's unique geographical and economic position drove the rapid advancement of the Soviet helicopter industry. The immediate requirement for Russian helicopters was for economic, not military, reasons. However, it is important to understand that helicopter design bureaus were working primarily for military forces and their designers were conscious of the need to develop equipment that would be available for service in battle and could be operated without difficulty by soldiers in the field. Thus, Soviet helicopters were usually developed with military forces in mind, and tactical considerations governed design factors such as flight performance, survivability, payload, range and maintenance.

Major Rick D. Hancock
U.S. Army Training Program with Industry
McDonnell Douglas Helicopter Company
Mesa, AZ

The remote regions of Siberia contained the strategic resources required in the post war economy. The helicopter provided the only reasonable solution to Siberia's transportation requirements under these severe environmental conditions. In Siberia, complete railroads disappeared under water in the spring; airfield runways could operate only while frozen in the winter; and temperatures ranged from +100 degrees Fahrenheit (F) to -60 degrees F. The helicopter was the only vehicle that could move men and equipment over areas with no infrastructure and into areas unsuitable for airplanes. Only helicopters could support exploration and sustainability year round.

To provide these capabilities, the Soviets designed helicopters with large cargo and passenger loads, extended ranges and high speeds. Large, powerful aircraft that are characteristic of the Soviet helicopter today were the result. The Mi-6 Hook best exemplified this early concept. Designed to move drilling equipment to Siberia, the Mi-6 Hook had to carry a load six times larger than the current production model. The typically Russian solution

illustration by SSG Bob Rosenburgh
SSgt. ROSENBURGH



U.S. HELICOPTERS

was to take the current model and build models four times bigger. The result was a 1957 production model, the first to fly more than 300 kilometers (km) per hour and the largest helicopter in the world for 11 years. This approach represented the lack of technological innovation and risk taking that dominated Soviet industry.

Although the Soviet helicopter was, and still is, an economic necessity, it was not economically efficient. In 1955, the cost per metric ton per km was 5.56 to 1 over the cost of operating a fixed wing aircraft. When given this disparity, only a command economy such as the Russian could continue to pursue helicopters for commercial use. Lack of competition in the Russian system detracted from Russian innovation and risk taking.

The U.S. capitalist economy could not afford to pursue such an inefficient system as the Russian's. Military requirements drove Western helicopter advances. Only mobility requirements of the military could disregard the cost factor. Many automobile manufacturers entered the helicopter market, and General Motors organized the Eastern Aircraft Division in 1948. These manufacturers withdrew from the market after they determined that helicopters were not going to affect their markets, and military demands became the backbone for the U.S. helicopter business.

The first contract for an Army helicopter was let in June 1921. This unsuccessful contract given to George deBothezat, a Russian exile, was to provide a vertical takeoff and landing airmachine. Early contracts were for experimental helicopters that had not been proven to fly. As the technology grew and operational abilities expanded, military visionaries identified future missions to be accomplished by new undeveloped aircraft. This then is the genesis of American military helicopters; each is developed to meet a different tactical requirement.

Employment

The United States led the exploration of tactical applications for helicopters. In 1947, the Marine Corps established the first helicopter squadron in the world. The squadron's twofold mission was to evaluate aircraft for military suitability and develop operational concepts that could be supported by future aircraft. This mission became the cornerstone of the U.S. requirement-based acquisition process.

Manifestations of this process are different aircraft to accomplish specific missions. Each of our Services focuses on developing operational concepts and tactics to accomplish its unique mission. Since 1975, after the Department of Defense Helicopter Commonality Study, the Joint Services have influenced the filling of requirements; i.e., determination of the size and character of U.S. helicopters.

U.S. helicopter doctrine relates to combined arms contribution and such things as force multipliers, tactical flexibility, combat power and mobility. U.S. Army helicopter flight techniques are based on aircraft agility and the ability to avoid detection. Aircraft that fly low to the ground, vary their speed and place terrain between the helicopter and the enemy are fundamental to these techniques. Consequently, U.S. Army helicopters are small and agile. Moreover, large aircraft are probably more vulnerable to air defense systems. Today, most U.S. helicopters do not have the speed of the Soviet Hind.

SOVIET HELICOPTERS

Greater lift capacity in U.S. helicopters has resulted from advanced technologies in aerodynamics, metallurgy and power plants. Coupled with increased survivability, this lift capacity enhances the tactical versatility of U.S. helicopters, while the aircraft remain relatively small.

After observing the practicality of the use of the U.S. helicopters in Korea, the Soviet military accelerated helicopter procurement. This new assimilation of Soviet aircraft was displayed with an underlying attitude that helicopters were merely a means of transportation. In their military guise, Soviet helicopters were only considered for transportation purposes. The mammoth lift capabilities of Soviet helicopters provided operational level mobility opportunities. However, Soviet employment concepts for helicopters have never transcended the nearsighted approach of copying ways to apply existing aircraft for operational requirements.

Vietnam and the growing western and North Atlantic Treaty Organization (NATO) countries that embraced the helicopter for expanded military application had even more influence on Soviet helicopter procurement than Korea. Soviet analysts of the Vietnam War were impressed by the use of helicopters as gunships. They were particularly impressed by the low loss rates of helicopters as compared to fixed wing aircraft; therefore, they began to develop strap-on armaments to the transport fleet. The massive 1967 Dnepr River tests with armed Mi-8 Hips and Mi-4 Hounds validated the concept. The purely military helicopter, the Mi-24 Hind, was developed at this time.

The Soviets saw the chance again to realize the success enjoyed by the Ilyushin 11-2, Shturmovik, the close air support fighter of World War II. The Soviets designed this new fighter with armor protection and heavy armament, which were required to attack German armor units. Russian soldiers called the aircraft the Flying Tank.

The Mi-24 was designed to perform this same mission using the same tactics. In fact, the Hind-D is only a NATO designation. Soviets refer to it as the Shturmovik helicopter. According to this doctrine, stealth and terrain flight are less significant than speed and overwhelming firepower. When given the flat terrain of western Russia, terrain flight provides no advantages for employment of the helicopter; however, the Soviet mindset ignores the realities of fighting in other kinds of areas and the effectiveness of new air defense weapons.

Conclusion

Despite operational lessons learned, it is unlikely that either the United States or the Soviet Union will deviate from their established processes of developing helicopters. Fundamental differences are systemic and culturally ingrained; neither country sees a reason to change.

The Soviets will continue to pursue Western technology as a primary method of improving the quality and effectiveness of their weapons. They correctly perceive their inability for internal innovation. This does not represent a reevaluation of their doctrine. The Soviets will continue to embrace Shturmovik as the doctrine for all close air support. Production of the Mi-28 Havoc (a duplicate of the AH-64 Apache) represents only a theft of U.S. technology, not a movement toward U.S. tactics.

Mountain Flying

CW4 Walter V. Bettencourt
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Directorate of Evaluation and Standardization
U.S. Army Aviation Center
Fort Rucker, AL

ARMY AVIATION units must be prepared to operate anywhere on the globe in support of the Army's worldwide mission of ensuring peace and security for the United States and its Allies throughout the world. If Army Aviation is to be successful in this task, it must be adequately trained to operate in a variety of unique environmental conditions. Perhaps one of the most demanding of these is mountain flying.

The unique nature of military operations in a mountainous environment ensures that Army Aviation will serve a prominent role in any future conflict in such areas. If aviation is to be ready to fulfill its assigned tasks, it must be adequately trained and prepared. Field Manual (FM) 1-202, "Environmental Flight," states: "Regardless of how much theory you may know or how many flight hours you have flown, until you have actually participated in mountain flight, the required degree of proficiency cannot be acquired. Mountain operations require special training, acclimatization and a high degree of self-discipline if operations are to succeed." No Department of the Army level course of instruction is available to train aviators in mountain flying techniques. Within the Reserve Component, the Colorado National Guard has expended much hard work and effort to develop a mountain training program that will soon be available to National Guard aviators. For the foreseeable future, however, mountain flying will continue to be a unit level training program.

Army Regulation 95-1, "General Provisions and Flight Regulations," paragraph 3-16, requires that commanders develop an aviation standardization program to ensure the proper training of aviation units. In addition, Training Circular 1-210, "Aircrew Training Program Commander's Guide," outlines the following requirements for units operating in unique environments:

- Develop a unit standing operating procedure that adequately reflects the effect that environmental flight has on unit flight operations.
- Train newly assigned aviators at unit level in environmental flight.
- Require crewmembers to demonstrate proficiency in their unique environment to an instructor pilot or standardization instructor pilot.
- Develop task lists that reflect the appropriate special and additional tasks.

The results of recent visits to the field by Directorate of Evaluation and Standardization teams, however, indicate that mountain training is being overlooked in many unit aircrew training programs. Admittedly, in these days of ever-tightening budgets and reduced flying hour programs, it seems that all too often training requirements exceed the assets and time available to support them. However, the importance of adequate mountain training is a must if Army Aviation units are to complete their assigned tasks. It is, therefore, essential that unit level mountain training programs reflect realistic, attainable goals that adequately support the unit's mission requirements while minimizing the impact on the expenditure of already scarce unit assets. To achieve this goal, commanders must carefully review their unit's mission in peacetime and war and identify their specific needs for a mountain flying program. Once the need has been identified, a program of instruction can be developed that reflects the unique mission requirements of the unit in its environment.

Available information sources for developing unit programs on mountain training include the following: FM 1-202 that contains a recommended program of instruction for qualifying aviators for mountain flying and FM 90-6, "Mountain Operations." For additional information and assistance on mountain flying training write to the Directorate of Evaluation and Standardization, Ft. Rucker, AL 36362-5214, or call AUTOVON 558-2442 or 3504.

DES welcomes your inquiries and requests to focus attention on an area of major importance. Write to us at: Commander, U.S. Army Aviation Center, ATTN: ATZQ-ES, F. Rucker, AL 36362-5208; or call us at AUTOVON 558-3504 or Commercial 205-255-3504. After duty hours call Ft. Rucker Hotline, AUTOVON 558-6487 or Commercial 205-255-6487 and leave a message.

USAASO SEZ

Do's and Don'ts of Thunderstorm Flying

Mr. John McKeeman
U.S. Army Aeronautical Services Office
Cameron Station, Alexandria, VA

SUMMERTIME brings thunderstorms. Because the best policy is for aviators to avoid thunderstorms, the following do's and don'ts for avoidance pointers are offered:

- Don't regard any thunderstorm as "light" even when radar returns show the echoes are of light intensity.
- Don't land or takeoff in the face of an approaching thunderstorm. A sudden wind shift or low-level turbulence could cause loss of control.
- Don't attempt to fly under a thunderstorm even if you can see through it to the other side. Turbulence under the storm could be disastrous.
- Don't try to circumnavigate thunderstorms covering six-tenths of an area or more either visually or by airborne radar.
- Don't fly without airborne radar into a cloud mass containing scattered embedded thunderstorms. Scattered thunderstorms, not embedded, usually can be visually circumnavigated.
- Do avoid, by at least 20 miles, any thunderstorm identified as severe or giving an intense radar echo. This is especially true under the anvil of a large cumulonimbus.
- Do clear the top of a known, or suspected, severe thunderstorm by at least 1,000-feet altitude for each 10 knots of wind at the cloud's top. This exceeds the altitude capability of most aircraft.
- Do remember that vivid and frequent lightening indicates a severe thunderstorm.
- Do regard as severe any thunderstorm that tops 35,000 feet, or higher, whether the top is visually sighted or determined by radar.

If you cannot avoid penetrating a thunderstorm, the following are some *Do's* before entering the storm:

- Tighten your safety belt, put on your shoulder harness if you have one and secure all loose objects.
- Plan your course to take you through the storm in a minimum time and hold to your course.
- Establish a penetration altitude below the freezing level, or above the level of 15 degrees centigrade, to avoid the most critical icing.
- Turn on pitot heat and carburetor or jet inlet heat. Icing can be rapid at any altitude and cause almost instantaneous power failure or loss of airspeed indication.
- Establish power settings for reduced turbulence penetration airspeed recommended in your aircraft manual. Reduced airspeed lessens the structural stresses on the aircraft.
- Turn up cockpit lights to highest intensity to lessen danger of temporary blindness from lightening.
- Disengage altitude hold and speed hold modes if using automatic pilot. The automatic altitude and speed controls will increase maneuvers of the aircraft thus increasing structural stresses.
- If using airborne radar, tilt your antenna up and down occasionally. Tilting it up may detect a hail shaft that will reach a point on your course by the time you do. Tilting it down may detect a growing thunderstorm cell that may reach your altitude.

The following are some *Do's* and *Don'ts* during thunderstorm penetration:

- Do keep your eyes on your instruments. Looking outside the cockpit can increase danger of temporary blindness from lightening.
- Don't change power settings; maintain settings for reduced airspeed.
- Do maintain a constant altitude; let the aircraft "ride the waves." Maneuvering while trying to maintain constant altitude increases stresses on the aircraft.
- Don't turn back once you are in the thunderstorm. A straight course through the storm most likely will get you out of the hazardous area more quickly. In addition, turning maneuvers increase stresses on the aircraft.

For further information contact Mr. John McKeeman, AUTOVON 284-7796/6304 or Commercial 202-274-7796/6304.

USAASO invites your questions and comments and may be contacted at AUTOVON 284-7773.

Lieutenant Colonel Thomas E. Johnson
8th Battalion, 158th Aviation
APO New York

MY LAST FLIGHT

YESTERDAY MARKED a significant milestone in my military career. After a rather uneventful flight, I returned home to Hanau and landed my trusty UH-1 Huey for the last time. I was about to give up command, and with it, my hopes for ever being at the controls of another Army aircraft. Those of you who have taken your last flight probably understand my feelings that day, but after more than 20 years of flying it was, without fanfare, all over.

As I flew along that day, I remembered my first day in flight school at Ft. Wolters, TX, when I showed up 2 hours late and was almost thrown out before I saw my first helicopter. I thought back to many anxious moments, as I tried desperately to keep my hover within the size of a football field. Who will ever forget his first solo, when at last it is just you and a prayer that gets you around the pattern without your instructor to help you out?

And I remember well my first test flight, 2 days after graduating from flight school, when my company commander showed me how to preflight and test fly an aircraft, all without a single glance at a checklist. It's not that he was so good, he didn't need one. It's just that 20 years ago you proved your technical prowess by doing it all by memory. Only wimps used checklists. My first and only assisted test flight lasted less than an hour, and from then on I was left on my own. Remember, I had just graduated from flight school and was as green as they come.

And of course, I thought back to flying in Vietnam, and dodging artillery fire, thunderstorms and bullets, not necessarily in that order. And I remembered transitioning into fixed wing aircraft and being able to take a training flight and actually going someplace that was more than 50 miles from home base.

I had amassed just under 2,000 hours, keeping me short of my master wings, and became qualified in six different fixed and rotary wing aircraft, the overwhelming majority of that time in a Huey. Suddenly, that part of my career was over. This last flight did two things for me. First, it

The Bell UH-1 Huey has been dubbed the reliable workhorse for the Army.

made me feel quite old, because to me, flight school seems like it was just last month. Second, and most important, it made me realize what a fantastic flying machine the Army had purchased more than 20 years ago, when it took possession of the first UH-1 helicopter in the Army inventory. In the years to follow, the Army would purchase more than 9,000 Hueys, making it the largest fleet of helicopters in the free world.

Now you new aviators might look at this helicopter with ambivalence, as it certainly is not as flashy as those that have recently come into our inventory, but remember this. After hundreds of thousands of hours, in every environment and flight condition imaginable, the Huey is still out there earning its keep and doing a great job. Sort of like an old workhorse, it's not too pretty, but quite dependable. This is surely the "Gooney Bird" of the rotary wing fleet.

What really struck me as I was flying along is the fact that I never once had a reason to be scared by that aircraft. Sure, I have had some pretty tense moments while flying, but they were the result of weather, or other aircraft, or the enemy trying to pluck me out of the sky, but never did I encounter an actual emergency situation. That is not to say that I didn't have to occasionally put it down in a corn field to check the validity of my master caution panel because that would be a lie. But after memorizing my dash 10 emergency procedures for years and years, I never had to use them. I find that quite extraordinary, and yet I think my experience is the rule rather than the exception.

So there is no doubt in my mind that the UH-1 helicopter is a great bird, but it certainly doesn't end there. I can still remember every crewchief I ever had, and why shouldn't I. These soldiers always took great pride in their aircraft, and each and every time I climbed in one it performed as advertised. The Army has put million dollar machines and our lives in the hands of 20-year-olds, and have they produced! And we can't forget the soldiers working in the shops who ensure all the stuff that goes on a helicopter works like it should. There are so many people involved in keeping a single aircraft flying, it is a minor miracle that it all comes together time after time.

So, if you haven't hugged your crewchief lately, or walked through the maintenance hangar to give those soldiers a pat on the back, I highly recommend it. It will make them feel great, and it will give you a boost too. Thank you Army for allowing me the opportunity to become an aviator, thanks to the manufacturers for building great airplanes, and thanks to the support of thousands of dedicated soldiers who are professionals in every sense of the word. Because of you, my last flight was as uneventful as my first.

AVIATION PERSONNEL NOTES

Transition to the New Noncommissioned Officer (NCO) Evaluation Report (ER)

Transition to the new NCO ER is under way at full throttle. The implementation of the transition schedule (figure 1) is designed to be implemented from the top down (by grade). Doing so will ensure that the transition workload is evenly distributed and fair.

The following professional development items available regarding this vital topic are:

- DA Pamphlet 623-205, "The Noncommissioned Officer Evaluation Reporting System—In Brief," dated 27 January 1988.
- Television tape 12-22 (plan identification number 707335), NCO-ER: A New Beginning. The tape was distributed to all training and audiovisual support centers in January 1988.
- NCO ER briefing scripts with camera-ready slides to support the NCO development program can be obtained from command sergeants major.

Grade	Final Possible Enlisted Evaluation Report Ending Date (Current System)	Initial Performance Counseling	First Possible NCO Evaluation Report (New System)
E9 and E8	29 February 1988	March and April	1 June 1988
E7 and E6	31 May 1988	June and July	1 September 1988
E5	31 August 1988	September and October	1 December 1988
Corporal	Not Applicable	December	Not Applicable

FIGURE 1: Transition to new NCO evaluation report.

Cardiovascular Screening for Command Selectees

Officers scheduled for a precommand course are required in accordance with Army Regulation 40-501, "Standards of Medical Fitness," to have a cardiovascular screening before attending the course. However, the U.S. Army Training and Doctrine Command reports a continuing trend of officers reporting to precommand courses without having completed the required screening, thus slowing down processing and taxing host installation resources.

To prevent this problem, all attendees must complete the required screening before reporting for the course. Those attendees having a current Department of the Army (DA) Form 4970, "Medical Screening Summary Over 40 Physical Fitness Program," in their medical records will not require another, as long as it reflects a recent screening; i.e., meeting the mandatory stipulation that the screening has been within the previous 5 years.

Army Aviation Branch Song

In February 1984, the *Aviation Digest* initiated the search worldwide for the Army Aviation Branch song. That competition culminated nearly a year ago, on 4 July 1987, during a notable event that occurred on the parade field at Ft. Rucker, AL. On that day the Aviation Branch first played its new branch song, "Above the Best," as part of Ft. Rucker's Independence Day celebrations. Although not the first song to be written about and for Army Aviation, it is the first such composition to be widely distributed.

The song was written by a loyal friend of Army Aviation, Mrs. Jo Johnston of Ozark, AL. She formally presented the song to the Army as a gift on 1 July 1987. Then, on 19 July 1987, the Chief of Army Bands officially approved "Above the Best" as the Army Aviation Branch song. Its purpose is to pay tribute to all those who fly, maintain and support Army Aviation and also to preserve the memories of those in the past who served Army Aviation and their country so well.

Worldwide distribution to aviation units has been completed. For those units who may not have received a copy, sheet music and cassette tapes can be obtained by writing Commander, USAAVNC, ATTN: ATZQ-BDE-AE (1SG, 98th Army Band), Ft. Rucker, AL 36362-5000; or call AUTOVON 558-4003/3187, Commercial 205-255-4003/3187.

Promotion Selection for Majors

Promotion selection board results for major, Army competitive category were released 1 March 1988. Aviation results generally followed the same percentage pattern as Army totals, with the Aviation Branch being slightly higher than average in the previously considered category and slightly lower in the primary and below-the-zone categories. Figure 2 depicts trends for the last 5 years.

The trend shows that, although percentages of selectees have declined, there has been a significant, relatively steady rise in the actual number of officers promoted from the primary zone. The main message derived from the data presented is that individual officers should seek the most challenging jobs and do well in them, particularly command; required schooling, such as the Combined Arms and Services Staff School, is a must. Thus, even in the current milieu of tough competition for field grade selections, there is plenty of room for those with solid backgrounds of experience and the required strong potential.

	Previously Considered and Selected	First Time Considered and Selected	Total Considered and Selected (Below the Zone)
1988 Total Army	834/43 (5.2 percent)	3,417/2,215 (64.8 percent)	3,367/250 (7.4 percent)
1988 Army Aviation	68/7 (10.3 percent)	345/210 (60.8 percent)	342/19 (5.5 percent)
1987 Total Army	689/65 (9.4 percent)	2,944/2,133 (72.4 percent)	3,609/115 (3.1 percent)
1987 Army Aviation	66/4 (6.0 percent)	224/156 (69.6 percent)	356/2 (0.5 percent)
1986 Total Army	576/59 (10.2 percent)	2,629/1,982 (75.3 percent)	3,060/46 (1.5 percent)
1986 Army Aviation	81/7 (8.6 percent)	244/196 (80.3 percent)	232/2 (0.8 percent)
1985 Total Army	591/119 (20.1 percent)	2,204/1,695 (76.9 percent)	2,749/52 (1.8 percent)
1985 Army Aviation	87/14 (16.0 percent)	237/185 (78.0 percent)	254/2 (0.7 percent)
1984 Total Army	708/144 (20.3 percent)	2,161/1,686 (78.0 percent)	2,282/30 (1.3 percent)
1984 Army Aviation	107/26 (24.2 percent)	189/152 (80.4 percent)	202/4 (1.9 percent)

FIGURE 2: Promotion selection board results for major.

UNITED STATES ARMY AVIATION CENTER

HOTLINE

Commercial 205-255-6487
AUTOVON 558-6487

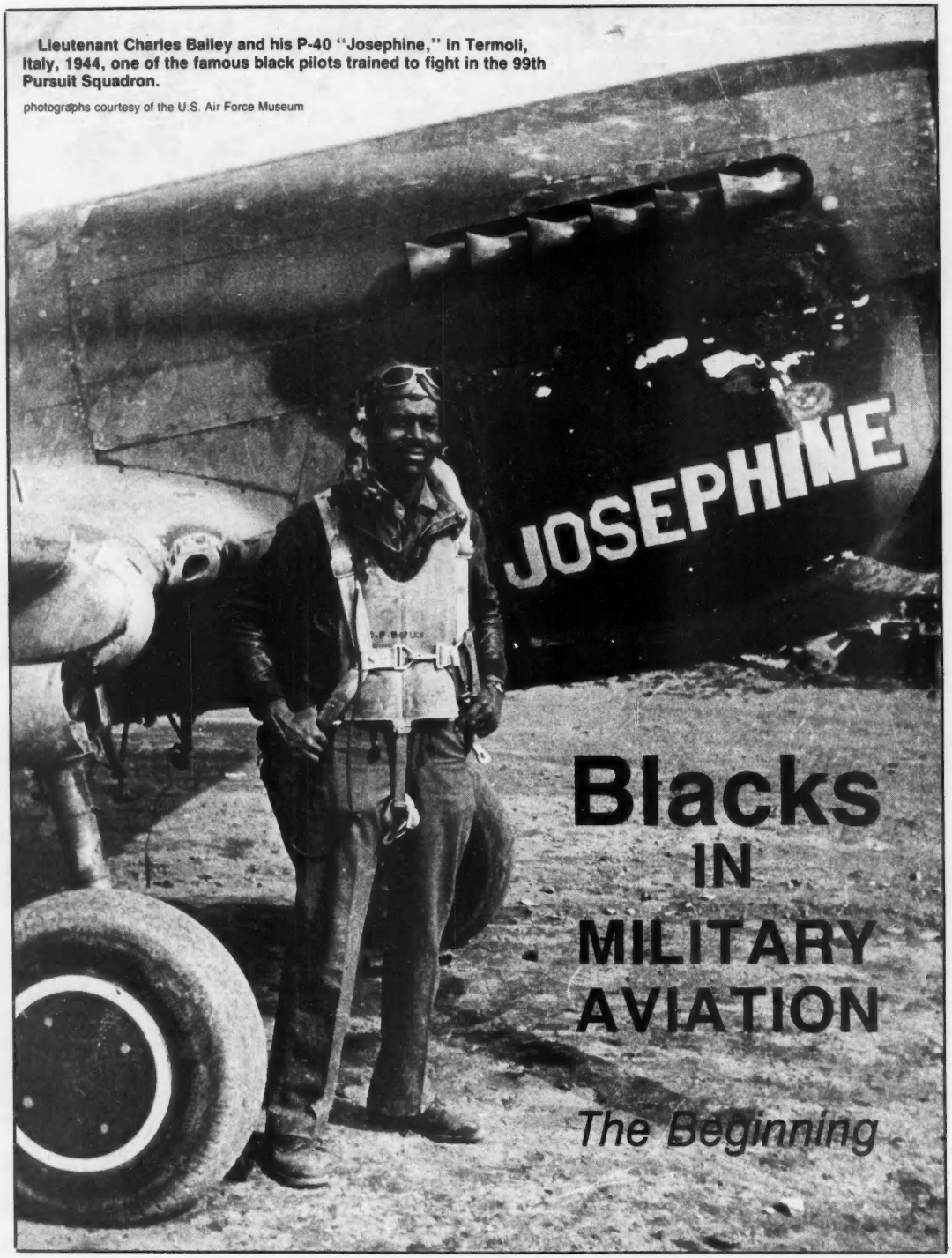
Got a question on aircraft survivability equipment (ASE) or need information on multiple integrated laser engagement system/air-to-ground engagement simulation (MILES/AGES)? Your solution may be just a telephone call away!

The Army Aviation Center, Ft. Rucker, AL, HOTLINE has been a source of aviation-related information since June 1979. This service is published each month in the *Aviation Digest* at the end of the Directorate of Evaluation and Standardization's Report to the Field.

Directorate of Training and Doctrine personnel record telephone messages, transcribe them the next duty day, and direct them to an appropriate agency that provides the inquirer an accelerated answer.

Both the HOTLINE and the answer service record messages 24 hours a day, 7 days a week. We recommend, however, that regular telephone numbers of the agency that can answer a particular query be used during regular operating hours (0730 to 1615 CST). For the above ASE or MILES/AGES subject areas, the daytime telephone numbers are AUTOVON 558-4110/3917 or Commercial 205-255-4110/3917. Calling these numbers will ensure a quicker response since recordings are not transcribed immediately.

This service should be of particular interest to Reserve Component units when questions arise during their multiple unit training assemblies or annual training periods.



Lieutenant Charles Bailey and his P-40 "Josephine," in Termoli, Italy, 1944, one of the famous black pilots trained to fight in the 99th Pursuit Squadron.

photographs courtesy of the U.S. Air Force Museum

Blacks IN MILITARY AVIATION

The Beginning

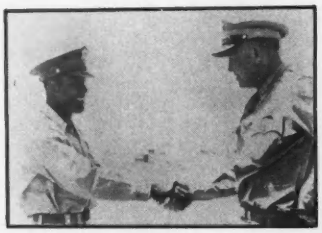
Captain Perry Smith
Captain Smith was assigned to Aviation Officer Advanced Course 87-1, U.S. Army Aviation Center, Fort Rucker, AL, when he wrote this article.

IN THE DAY OF the attack on Pearl Harbor, of all the service branches only the U.S. Army Air Corps was all white. In 1939, Congress provided for the establishment of black civilian pilot training schools. These schools were to train a cadre of flyers should the United States become involved in the war. During that first year, 91 blacks (out of a class of 100) passed, but the Air Corps was reluctant to accept the graduates. The Air Corps stated that, since their policy was not to mix blacks and whites, and no provisions had been made to create a black air corps, they could not enlist blacks because there were no units to which to assign them.

By early 1941, feeling pressure from politicians eager to gain the black voter bloc, the Air Corps established one black pursuit squadron. With the activation of the 99th Pursuit Squadron on 22 March 1941, Tuskegee Army Airfield in Alabama was established for its training. Following graduation, the 99th encountered difficulties obtaining an overseas combat mission. The Air Corps could find no place for the unit because no one wanted it. It was to remain stateside for a year before receiving orders for North Africa.

The squadron was sent to North Africa in April 1943, where it became part of the 79th Pursuit Group. Flying low-altitude P-40s, it became known as the "Falcon Desert Fighter Group." Leading the 99th when it arrived in

Colonel Benjamin O. Davis Jr. led his unit—the Falcon Desert Fighter Group—into combat in North Africa, proving that black airmen could fly and fight as well as white pilots.



Lieutenant Charles B. Hall, another of the brave black fighter pilots of the 99th Pursuit Squadron. LT Hall had many narrow escapes from enemy planes and was commended for shooting down a German Focke-Wulf 190.

North Africa was Lieutenant Colonel Benjamin O. Davis Jr., a black officer who had graduated from the United States Military Academy in 1936. The officer's father had been promoted to brigadier general in 1940, the first black to achieve this rank.

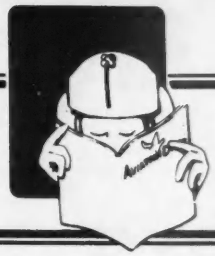
On the unit's first mission, Lieutenant Charles B. Hall won the Distinguished Flying Cross for shooting down a German Focke-Wulf 190. After the 99th had been in combat for more than a year, it was transferred in July 1944 to the 33d Fighter Group, an all-black organization.

Under the command of Colonel Davis, who in 1942 had been promoted to major and then to lieutenant colonel in a single day, the group won acclaim for being an outstanding combat unit. Colonel Davis personally flew on 60 missions, earning the Legion of Merit on three occasions, the Distinguished Flying Cross, the Air Medal with four Oak Leaf clusters and the Silver Star. After the war, Colonel Davis followed in the footsteps of his father to become the first black general officer in the U.S. Air Force on 27 October 1954. After his promotion in 1965 to lieutenant general, Davis was named chief of staff, U.S. Forces in Korea, and chief of staff, United Nations Command in Korea.

Despite the many drawbacks that blacks faced in the military, these gallant airmen, such as Lieutenant Charles Bailey and Lieutenant Charles B. Hall, displayed outstanding courage and aggressiveness. Had it not been for their professional skill and determination, they would not have been successful in opening the door for blacks in military aviation, nor would they have secured a place in history for themselves and all black Americans.

Lieutenant General Davis as chief of staff, U.S. Forces, Korea, and chief of staff, United Nations Command, Korea, contributed immeasurably to the integration of blacks in the U.S. Air Force from 1965 to 1970.

VIEWS FROM READERS



Editor:

I found CPT Harp's article on the power drag chart [*Aviation Digest*, February 1988, page 38] right on the money in all respects but one. His discussion of best angle of climb airspeed and the accompanying chart at figure 4 are valid only where power required to hover is equal to or greater than power available.

The chart at figure 4 indicates power available is greater than power required at a hover. Hence, the aircraft should be able to ascend at an angle 90 degrees from the horizon. Any airspeed used to get a higher rate of climb would result in an angle of climb less than 90 degrees. If, on the other hand, the relationship between power available and required is as shown in figure 7 (before/during mission), CPT Harp's instruction is valid as the best angle of climb airspeed would be found somewhere to the right of the left edge of the mission envelope.

I think with this one correction, CPT Harp's article will be even better mental food for the thinking aviator.

CPT Andrew L. Neill
C Troop, 2-7 Cavalry
Ft. Carson, CO

Editor:

As you can see from the enclosed brochure, the United States Military Academy (USMA) is going all out to secure the finest faculty and staff possible to train our future leaders. Army officers have a great opportunity to secure a quality master's degree en route to USMA and teach and lead some of the finest young men and women in the world.

Since many officers are not aware that graduates from institutions other than West Point, females and other minorities are encouraged to serve at the Academy, I would ask that you help us publicize the opportunity. You could do so by putting a notice in the section of your publication that talks about assignments. Feel free to excerpt comments from the brochure and the other enclosures. If you have any questions please call me at AUTOVON 688-3500.

Thank you for your support.

COL Lawrence T. Daly
Adjutant General
United States Military Academy
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• For further information write: Superintendent, U.S. Military Academy, ATTN: MAAG-PM, West Point, NY 10996-5000.

Editor:

Request that you publish the following notice in your periodical.

LTC Raymond L. Schaefer
Commander, 1st Bn, 223d Avn Regt
Aviation Training Brigade
Ft. Rucker, AL

On 17 November 1987, the 8th Aviation Training Battalion, Aviation Training Brigade, Ft. Rucker, AL, came under the regimental system. It was redesignated the 1st Battalion, 223d Aviation (Regiment). The 223d Aviation has a short but rich history that dates back to the early days of the Vietnam War.

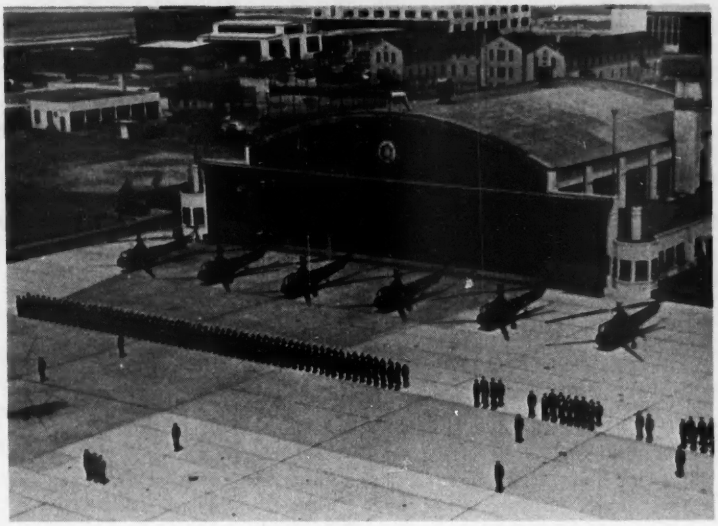
While researching the history of the 223d Aviation Battalion, we could not locate a battalion motto. We are seeking help to identify the battalion motto or call signs used by the battalion. It will help us to piece together some empty spaces in the battalion's past.

We welcome all information about the battalion and will include it in the 223d Aviation unit historical files. Please contact: LTC Raymond L. Schaefer, Commander, 1st Bn, 223d Aviation, Cairns AAF, Ft. Rucker, AL 36362-5230; or call AUTOVON 558-4314/4914.

Readers can obtain copies of material printed in any issue by writing to:
Editor, U.S. Army Aviation Digest, *P.O. Box 699, Ft. Rucker, AL 36362-5042.*

Ensign Chris Baur

Floyd Bennett Field's 60th Anniversary



Air Station Brooklyn and part of Floyd Bennett Field, circa 1940, with the original XR-4 Sikorsky helicopters, state-of-the-art for that day.

ON 14 MAY 1988 Floyd Bennett Field, in Brooklyn, NY, celebrated its 60th anniversary. Floyd Bennett Field has been home to many aviation record-setting events. It was here that the first U.S. Army helicopter pilots were trained. An account of this historic aerodrome follows.

It all began at Naval Air Station (NAS) Rockaway in 1919. A home to the famed "Flying Boats," NAS Rockaway was the start point for NC-4, the first plane to fly the Atlantic.

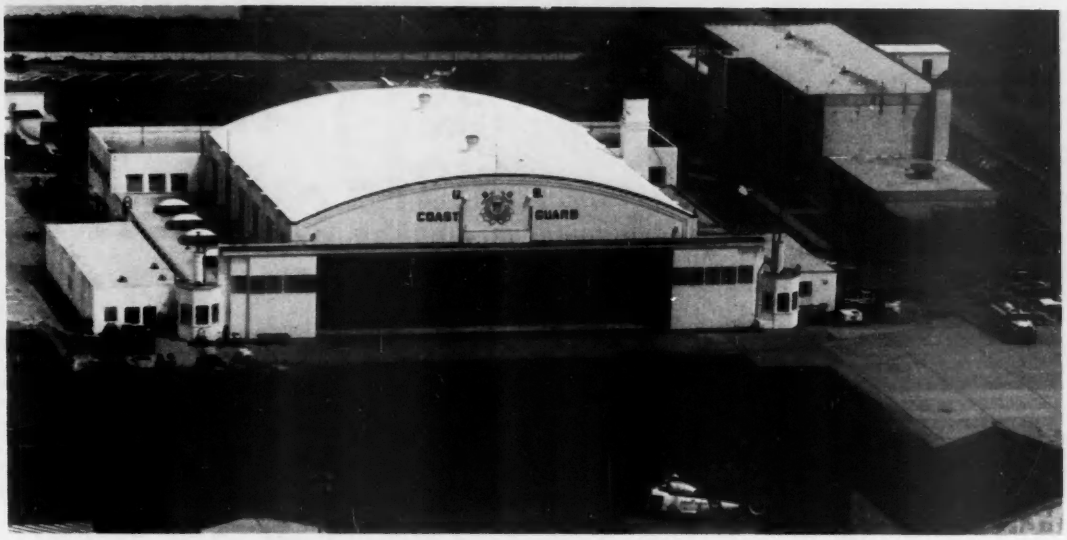
Recognizing the need for an adequate airport, the City of New York, in 1928, commissioned Clarence Chamberlain, a noted aeronaut, to study the principal airports abroad. Upon his return, Mr. Chamberlain explored extensively the New York area and eventually selected Barren Island in Jamaica Bay, NY, as comparatively free from the mists that usually enveloped the harbor area. A 200-foot smokestack from a glue factory represented the only hazard to air operations.

New York City employees raised the swampy island to 16 feet above sea level. They pumped sand out of Jamaica Bay and connected the 321 acres to nearby Flatbush Avenue in Brooklyn. Mr. Chamberlain's decision to raise Barren Island also caused more than a few eyebrows to be raised because a suitable area already existed in Hackensack Meadows, NJ. Even today many naval aviators will support Chamberlain's statement about Barren Island; "It is easily found from the air. No smoke obscures it day or night."

The new airfield was named Floyd Bennett Municipal Airport at its dedication on 23 May 1931 by Rear Admiral (RADM) Byrd. Warrant Officer Floyd Bennett was a copilot on RADM Byrd's famous polar flights. He died in an unselfish attempt to rescue three downed flyers whom he had never known. Mrs. Floyd Bennett and Mayor Jimmy Walker attended the formal opening ceremonies for the new municipal airport.

In the 10 years from the dedication of the municipal airport to the commissioning of the U.S. Naval Air Station New York, many aviation "firsts" were credited to the field. In 1933 Wiley Post flew the Winnie Mae around the world in 7 days, 19 hours. A star-shaped bronze plaque is embedded in a 9-foot concrete area on the field's rear surface of the control tower. The spot marked the start and finish of his solo flight. However, in 1938 this record was broken by Howard Hughes when he flew it in 3 days, 19 hours. Amelia Earhart was a constant visitor to the field where she accumulated numerous records. Wrong Way Corrigan's rise to fame began with his 1938 flight in a $900 airplane from Floyd Bennett Field to Dublin, Ireland. Colonel Roscoe Turner took off from Floyd Bennett at 0459 hours and arrived in California 11 hours and 30 minutes later to set a new east-west record in July 1933. Two days later, General Itala Balboa of Italy landed his fleet of more than 20 seaplanes in the adjoining bay en route to the Chicago's World Fair. In September 1938 Jacqueline Cochrane set a new transcontinental speed record of 234.7 miles per hour before landing at Floyd Bennett.

On 19 January 1936 Mayor Fiorello LaGuardia of New York City an-



A view of Air Station Brooklyn and part of Floyd Bennett Field today.

nounced that the Coast Guard executed a 50-year lease for facilities at the field. It was one of ten Coast Guard air stations that were established in April 1938 as authorized by Congress. It was here, under the direction of Lieutenant Commander (LCDR) Erickson, where the first 102 military helicopter pilots were trained. Air Station Brooklyn at Floyd Bennett Field was the home of the first military helicopter flight school. Pilots from the Army, Navy and foreign military services were trained in the Sikorsky XR-4 helicopter. It also was here that the helicopter rescue hoist was developed and employed. In 1944 the first helicopter rescue was performed when the pilot of a downed aircraft in Jamaica Bay was recovered by an XR-4 equipped with a hoist developed by LCDR Erickson. The XR-4 was the first helicopter to land aboard a ship flown by a composite crew. One of the pilots was a U.S. Army aviator.

In December 1936 two concrete runways were constructed by 2,700 Works Progress Administration laborers. In April 1937 the field was used as a scheduled stop for American Airlines; however, commercial flying ceased on 26 May 1941.

The Navy purchased Floyd Bennett Field from New York City June 1941 for $9½ million. At this time, it was expanded from 387 acres to 1,288 acres and renamed NAS New York.

During the war, NAS New York served as a home for antisubmarine units, fleet service squadrons and cadet flight training. It also was used as the ferry command to service and deliver naval aircraft from eastern factories to fleet. During this period a million pounds of air cargo were moved, and more than 5,000 passengers were transported, averaging 720 flights a month.

During the summer of 1967 the airfield was decommissioned. In 1972 the Department of the Interior acquired 1,050 acres and further developed the Gateway National Recreation Park.

Today, the Coast Guard Air Station Brooklyn comprises the only military aviation at Floyd Bennett, and on 14 May 1988 celebrated 60 years of service in an "open house" ceremony. Helicopters from the U.S. Army, Navy and Marine Corps were on display. With only 74 acres and 2,500 feet of runway, the station is manned by 28 officers and 119 enlisted personnel. Equipped with five HH-65A Dolphin short range and recovery aircraft, Air Station Brooklyn maintains an aggressive military readiness posture. Annually Air Station Brooklyn responds to the call of more than 300 search and rescue cases, and performs Marine law enforcement patrols, drug interdiction and aids to navigation flights.

ABOUT THE AUTHOR

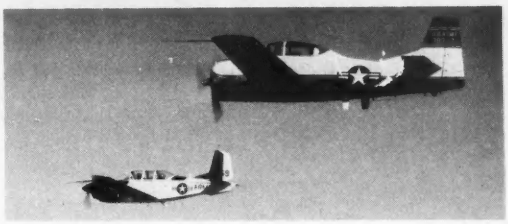
Ensign Chris Baur is a naval aviator, currently assigned to Coast Guard Air Station Brooklyn as an HH-65A pilot. A former Army aeroscout pilot, Ensign Baur was graduated from Army flight school in September 1983. He has had assignments to the 3d Squadron, 4th Cavalry, and the 184th Assault Helicopter Company.

photographs by Luvin Chavez

The U.S. Army Aviation Engineering Flight Activity's T-28B in flight near Edwards AFB, CA.

Last T-28 Retires Wearing Army Colors

Major John R. Martin
Corporal Larry Willens
U.S. Army Aviation Engineering Flight Activity
Edwards Air Force Base, CA



The Army's final T-28B aircraft calibrates the airspeed system of its successor, the T-34C.

ANOTHER AVIATION era ended on 27 March 1987, with the retirement of the last North American T-28 airplane in U.S. military service. Originally designed in the late forties as a U.S. Air Force and U.S. Navy trainer, the T-28 Trojan ended its distinguished career, surprisingly enough, wearing U.S. Army colors for its last scheduled flight.

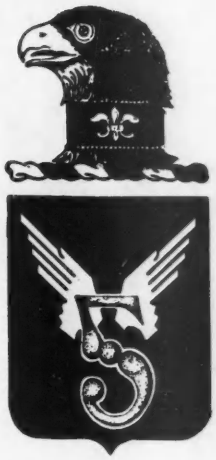
The last T-28 was a "B" model, a slight modification of the original T-28A. Its final journey started from the hangars of the U.S. Army Aviation Engineering Flight Activity (AEFA), the engineering flight test organization of the Army, located at Edwards Air Force Base, CA. Colonel Alan R. Todd, the AEFA commander, and also an instructor pilot was at the controls.

Spectators from the AEFA gathered with cameras in hand to watch the white and olive drab airplane prepare for takeoff. The T-28 sprang to life with a burst of white smoke and noise, then slowly rolled down the flightline toward the control tower. The other passenger in the two-seat aircraft was civilian crewchief Joe Fitzgerald. The historic final flight had a destination of McClellan Air Force Base, located in Sacramento, CA, where the T-28 will be displayed at the base museum.

The first of three T-28Bs arrived at AEFA in 1964. Its primary mission was that of airspeed calibration, a significant role in flight test. All test aircraft must have airspeed indicators calibrated to a known standard. After modification and extensive testing of its own airspeed indicating system, the T-28B became that known standard. The T-28 would "pace" a test aircraft by flying in close formation beside it. If the test aircraft's indicated airspeed did not match that of the T-28, its airspeed system was calibrated accordingly. The last mission of the T-28 involved the airspeed calibration of its successor, the Beechcraft T-34C, making it the new pace aircraft.

The T-28 more than served its original purpose in military aviation. It personified both grace and ruggedness. Its radial array of nine cylinders ("jugs" to the pilots) made it a nostalgic piece of aircraft machinery. One of its final missions was calibrating airspeed systems on new Army helicopters.

5th Aviation Regimental Activation



ON 8 MARCH, THE Aviation Brigade of the 5th Infantry Division (Mechanized) activated the 5th Aviation Regiment at Ft. Polk, LA.

On 20 July 1940, the 5th Aviation Battalion was first constituted into the Regular Army as the 5th Cavalry Reconnaissance Troop. The battalion was assigned to the 5th Division (later redesignated as the 5th Infantry Division). It was formally activated 10 August 1940 at Ft. Benjamin Harrison, IN; reorganized and redesignated 1 October 1943 as the 5th Reconnaissance Troop, Mechanized; reorganized and redesignated 4 March 1946 as the 5th Mechanized Cavalry Reconnaissance Troop. It was inactivated 20 September 1946 at Camp Campbell, KY; redesignated 6 July 1948 as the 5th Reconnaissance Company and activated at Ft. Jackson, SC; and inactivated 30 April 1950 at Ft. Jackson.

The company was again activated 1 March 1951 at Indiantown Gap Military Reservation, PA; inactivated 1 September 1953 at Indiantown Gap Military Reservation; activated 25 May 1954 at Augsburg, Germany; and inactivated 1 June 1957 at Ft. Ord, CA.

The organization was converted and redesignated 26 January 1962 as Headquarters and Headquarters Company, 5th Aviation Battalion (organic elements concurrently constituted); the battalion was activated 19 February 1962 at Ft. Carson, CO. (Headquarters and Headquarters Company, 5th Aviation Battalion, was reorganized and redesignated 12 February 1964 as Headquarters and Headquarters Detachment, 5th Aviation Battalion; Company A was inactivated 25 June 1966 in Vietnam.) The battalion (less Company A) was inactivated 24 June 1967 at Ft. Carson.

Headquarters and Headquarters Detachment, 5th Aviation Battalion, was redesignated 21 July 1975 as the Aviation Company, 5th Infantry Division, and activated at Ft. Polk. It was reorganized and redesignated 1 September 1982 as Headquarters and Headquarters Company, 5th Battalion (organic elements concurrently activated). The 5th Aviation Battalion and its organic elements were deactivated on 17 September 1986. On the same day, it was activated and redesignated as the 5th Attack Helicopter Battalion (AHB). The 5th AHB is presently assigned under the Aviation Brigade, 5th Infantry Division (Mechanized) at Ft. Polk.

Campaign participation credits include:

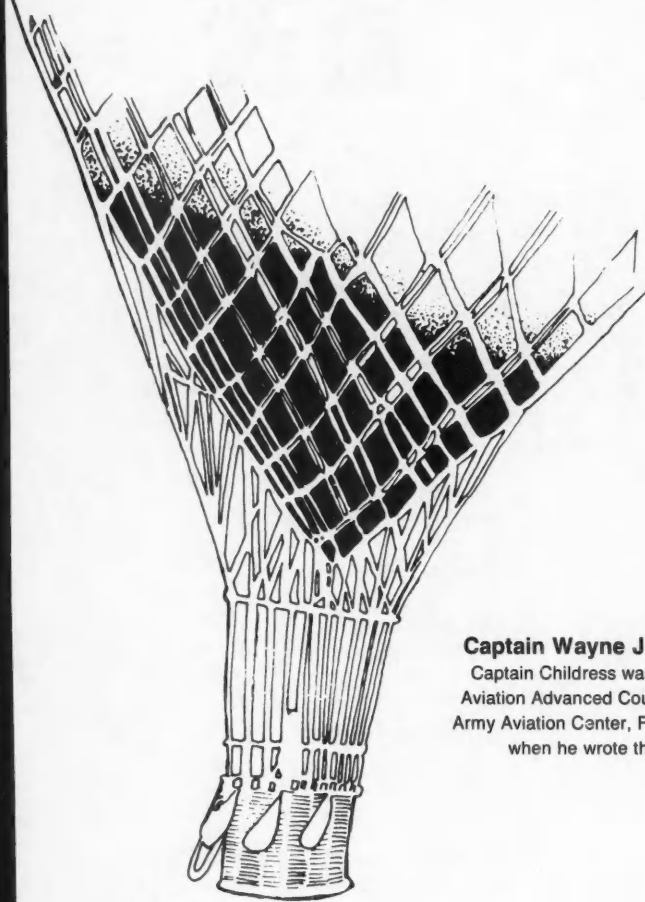
- World War II—EAME
- Normandy
- Northern France
- Rhineland
- Ardennes-Alsace
- Central Europe

Company A is additionally entitled to campaign participation credits:

- Vietnam
- Defense
- Counteroffensive

To resurrect the lineage, history and traditions of the 5th Aviation Battalion, former members who were once assigned to any of the units mentioned in the lineage, or individuals who were assigned to the immediate chain of command above those units, are asked to contact: CPT Hamm at 318-535-2505/6600/4026, AUTOVON 863-xxxx. Correspondence can be addressed to: Commander, Aviation Brigade, 5th ID(M) & FP, ATTN: S-1, Ft. Polk, LA 71459.

THE ORIGINS OF ARMY AVIATION



Captain Wayne J. Childress
Captain Childress was assigned to Aviation Advanced Course 87-4, U.S. Army Aviation Center, Fort Rucker, AL, when he wrote this article

THE SOUTHERN Confederacy had left the Union in April. It had been 3 months since Professor Thaddeus Lowe had offered his aeronautical services to the Federal Government. The last 3 months had been a disappointment for him. Even the last 3 days had been quite a trial. He felt tired and worn out, much older than his almost 29 years. The Confederate Army had routed McDowell's Federal Army at Bull Run on the 21st. Nobody knew for sure where the Confederate Army was or what it was doing. Rumors told of the victorious Confederate Army marching toward Washington. Washington was in turmoil. Professor Lowe had a difficult time wading through the War Department's bureaucracy trying to get his balloons into action.

Thaddeus Lowe looked toward the sky. It was clear and the winds seemed favorable. He would launch his balloon today. It was 24 July 1861. Finally, Professor Lowe would be able to use his balloon to help the Federal Army. He called for his father to get his maps and binoculars. At the same time he called for the ground crew to prepare his balloon, the Enterprise, for an ascent. Fort Corcoran was buzzing with excitement as Lowe's balloon corps prepared for flight. As Lowe lifted his balloon off the ground, he called for the ground crew to release the mooring cables. He began to rise.

As the balloon reached an altitude high over the area, Lowe could see the

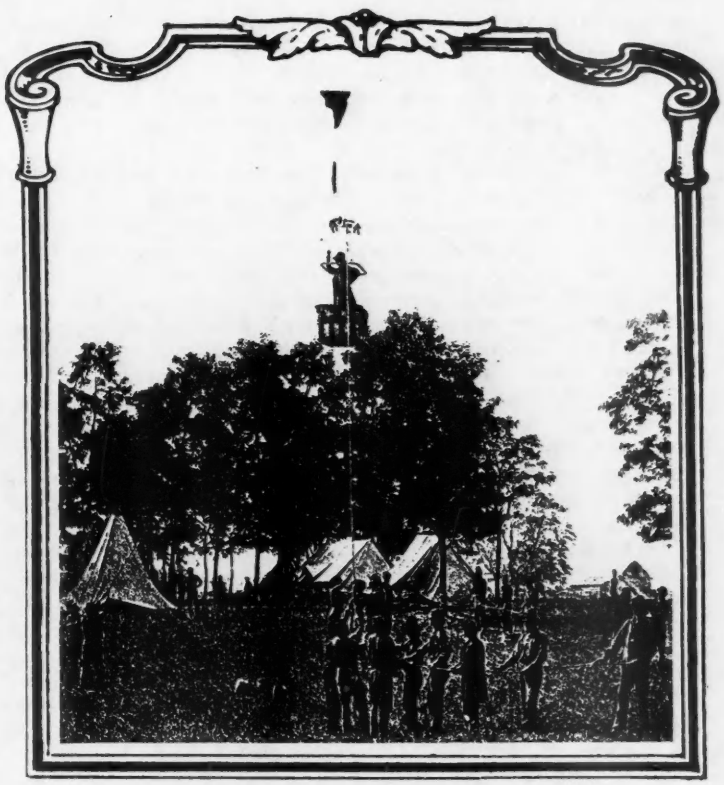
many Confederate camps and positions. Happy with his accomplishment, he hurriedly noted all of the positions that he could see from that altitude. For the first time since the start of the war in April, he felt that he was doing some good. His reconnaissance had proven that the Confederate Army was not marching on Washington. While his balloon carried him skyward, the winds drifted him forward of the Federal lines. The breeze, blue sky and the sweet smell of summer combined with his accomplishment to make Lowe a happy man.

As he descended and slowly drifted back toward the Federal lines, his bliss was interrupted by the sharp whine of minnie balls and shouting. Federal soldiers were shooting at him. He was able to land his balloon several miles away without any further incident. However, this case of mistaken identity nearly ended his aviation career. In the future, Lowe would add bright flags and portraits of George Washington to avoid being shot at by his own soldiers.

Thaddeus Sobieski Constantine Lowe was born in New Hampshire on 20 August 1832. He was always interested in flight and aerodynamics. As a youngster, he experimented with aerodynamics by designing and building kites and then sending the family cat aloft. As a teenager, Lowe became the assistant to a traveling prestidigitator. They traveled from town to town putting on simple chemistry and magic demonstrations. It was during this time that he became interested in chemistry and earned the nickname "Professor." In 1858, he built his first balloon and flew for the first time. From that moment on, Professor Lowe knew that his future lay in aviation.

At the outbreak of the Civil War, no fewer than four balloonists had offered their services to the Federal Government.

John LaMountain was able to get his



Professor Thaddeus S. C. Lowe ascends in the balloon Enterprise to observe and report Confederate soldiers' positions during the Civil War.

balloon into service very quickly. He used his balloon to observe the Confederate camps and forts. He performed aerial demonstrations by flying his balloon over the Confederate positions on the low-level air currents. He would then fly back across to the Federal lines by sailing on the high air currents. He also performed aerial observations, while his balloon was tethered to a small armed transport. He was the first aviator to operate his aircraft from the deck of a ship. He constantly demonstrated his daring and courage while flying his balloon against the Confederate Army. LaMountain's aerial exploits were dismissed by his contemporaries as theatrical. The Federal Government soon dismissed LaMountain.

Professor Lowe soon filled the void left by LaMountain and became the Army's chief balloonist. On 18 June 1861 he made history by sending the first telegraph message from a balloon. Lowe sent a telegraph message to President Abraham Lincoln from the dizzy altitude of about 500 feet. In September of the same year, he used this telegraph technique to send artillery observations and adjustments from his balloon to a battery 3 miles away. Lowe improved on John LaMountain's balloon and boat technique to establish a highly mobile balloon. He built a new deck on the U.S.S. *G. W. Parke Custis* and added some other necessities for balloon operations. Lowe then sailed this ship up and down the Potomac River with his balloon tethered at about 1,000 feet. The *Custis* became the first aircraft carrier in history.

Mobility was the greatest problem faced by the Civil War balloonists. Professor Lowe solved this by designing a mobile hydrogen generator for his balloon corps. This eliminated the need for nearby city gas works to fill the balloons and Lowe's men to have to tow the filled balloons to the battlefield. These generators allowed Lowe to follow the Army and to inflate the balloons when they were needed.

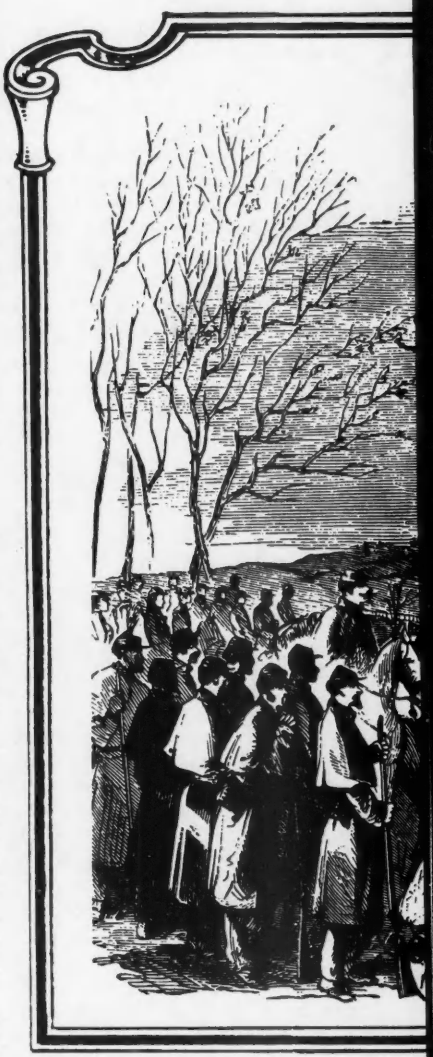
Lowe's balloons proved to be quite a headache for the Confederate Army. The Confederates had to spend a considerable amount of time camouflaging their positions. They built fake artillery emplacements out of logs and stove pipes painted black. They also lit numerous campfires outside of the Federal positions to make their strength seem larger than it was. They also tried unsuccessfully to establish their own balloon corps. The Federal blockade had severely limited the materiels needed for balloon making.

Professor Lowe's balloon corps continued to provide the Federal Army with reconnaissance and fire direction. During the battles of Fredericksburg and Chancellorsville, his balloons kept the Federal commanders informed of the enemy's positions. During the battles of Fair Oaks and Gaine's Mill in 1862, his balloons actually saved the Federal Army by providing valuable information and reconnaissance. This aerial reconnaissance by Lowe's balloon could provide the Army commanders with the information necessary to win battles.

For all of the good that Lowe had done, his balloon corps would not survive the war. Just 2 years after the war had begun, Lowe decided to leave the Army. He felt stifled by the War Department's bureaucracy. At times his balloon corps went without pay for months. At other times, his balloons were left idle for months. Professor Lowe had his own ideas on how to use his balloons on the battlefield and felt the ground commanders should not tell him how to use his balloons. However, most of the military officers that he had to work for felt otherwise. He was almost always at odds with the military commanders of the Federal Army. In the end, Professor Lowe grew tired of the war. In 1863, he packed up his balloons and equipment and went home. The Allen Brothers took over the balloon corps from Lowe. However, they ware not able to assert themselves and the balloon corps was disbanded.

During the short period that Professor Lowe served with the Federal Army, he made many valuable contributions to Army Aviation. His efforts proved to the world the value of aviation in military operations. He pioneered the use of aviation to call for and adjust field artillery fires. He designed the first aircraft carrier and operated his balloon from it. He designed and built a mobile hydrogen gas

Both the Enterprise and Intrepid



generator that increased the tactical mobility of the balloon. And, most important, he perfected the system for using a telegraph system with a balloon to send rapid reconnaissance and information to the ground commander.

Thaddeus Lowe's balloon corps established aviation within the U.S. Army. The Army did not use the balloon again during the Civil War after the summer of 1863. However, Lowe's accomplishments did not go unnoticed. Several European armies noticed the accomplishments of Lowe's balloons. Count Ferdinand von Zeppelin of the German Army studied Lowe's accomplishments and used them during the Franco-Prussian War and World War I. The U.S. Army used balloons during every major war from the Civil War through World War II. Professor Lowe's aviation accomplishments, especially his field artillery adjustment techniques and his wire communications, proved the value of aviation and were indeed the origins of the Army Aviation Branch.

were a vital part of Professor Lowe's Balloon Corps and made significant contributions to the concept of Army Aviation.

MONTHLY WRITING AWARD

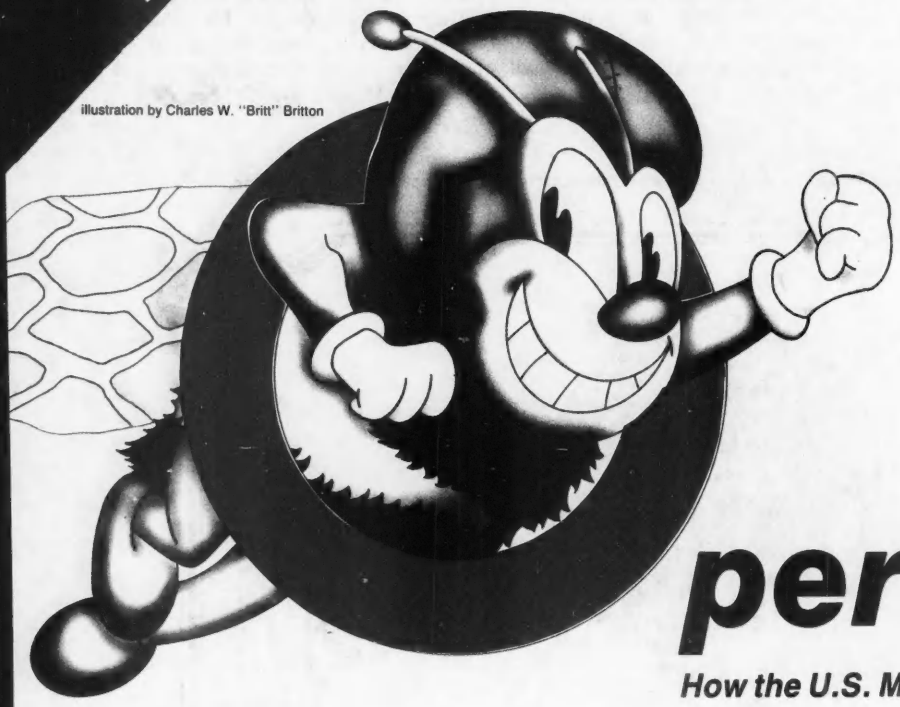


illustration by Charles W. "Britt" Britton

peration

How the U.S. Marine Corps developed

MOST PEOPLE familiar with the history of Army Aviation know about the 11th Air Assault Division (Test), which later became the 1st Cavalry Division (Airmobile). The division developed the Army's early tactics for rotary wing airmobile insertion of troops into combat.[1] These tactics were further refined during the early years of the war in Vietnam.

But few people in Army Aviation are aware that, in the fall of 1951, the U.S. Marine Corps (USMC) conducted battalion-sized air movement and airmobile operations in the Korean War. This is the story of the events leading up to the first battalion-sized airlift, and the actual conduct of this operation, code named Operation Bumblebee.

Early Marine helicopter tactics were developed in 1947 at Quantico, VA, with the Marine experimental squadron HMX-1. The test was designed to develop new tactics for landing a Marine fighting force by helicopter in an age of nuclear warfare. The fear was that the concentrations of transports, warships and aircraft carriers that had made possible the landings at Saipan and Iwo Jima would be sitting ducks for an enemy armed with atomic weapons. The test was also to evaluate, using a small helicopter as a replacement for the present OY type aircraft (light observation airplane), gunfire spotting, observation and liaison missions in connection with amphibious operations.[2]

The test resulted in the recommendation that small helicopters be combined with OY aircraft in fairly equal numbers for observation duties. The helicopter was noted for being better suited to transportation, evacuation and liaison flights, while the OY was superior at reconnaissance and artillery spot missions.[3] The test also produced development of tactical and logistical

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Captain McClellan was assigned to the Aviation Officer Advanced Cource 87-1, U.S. Army Aviation Center, Fort Rucker, AL, when he wrote this article. He is presently assigned to I Company, 227th Aviation, APO New York

Bumblebee

airmobile tactics during the Korean War

techniques for Marine helicopter landings to be made from widely dispersed carriers against an enemy using atomic weapons.[4]

First Use of Helicopters in Combat

From the start of their involvement in the Korean War, the Marines had used helicopters to evacuate wounded. By the end of its first year, the Bell HTL-4 (USMC version of the H-13) had taken over from the Sikorsky HO3S-1. The HO3S-1 was an earlier model of the HRS-1 (USMC version of the H-19). The HTL-4 was better for medical evacuation because of the ease of loading casualties onto the two outboard litters. Marine helicopters flew out 1,926 wounded in the first year of the war.[5]

The first Marine helicopter transport squadron did not arrive until August 1951. The HMR-161 was formed at El Toro Marine Corps Air Station near San Diego, CA, in January 1951. It had been called for after the HMX-1 test, but belated aircraft deliveries and the procurement slowdown after World War II delayed its commissioning. The 1st Marine Division wanted to test immediately the new squadron's capability to support combat operations. The HMR-161's first chance to prove itself came on 13 September 1951 with Operation Windmill I.

The 1st Marine Regiment began relieving the 7th Marines at their posi-

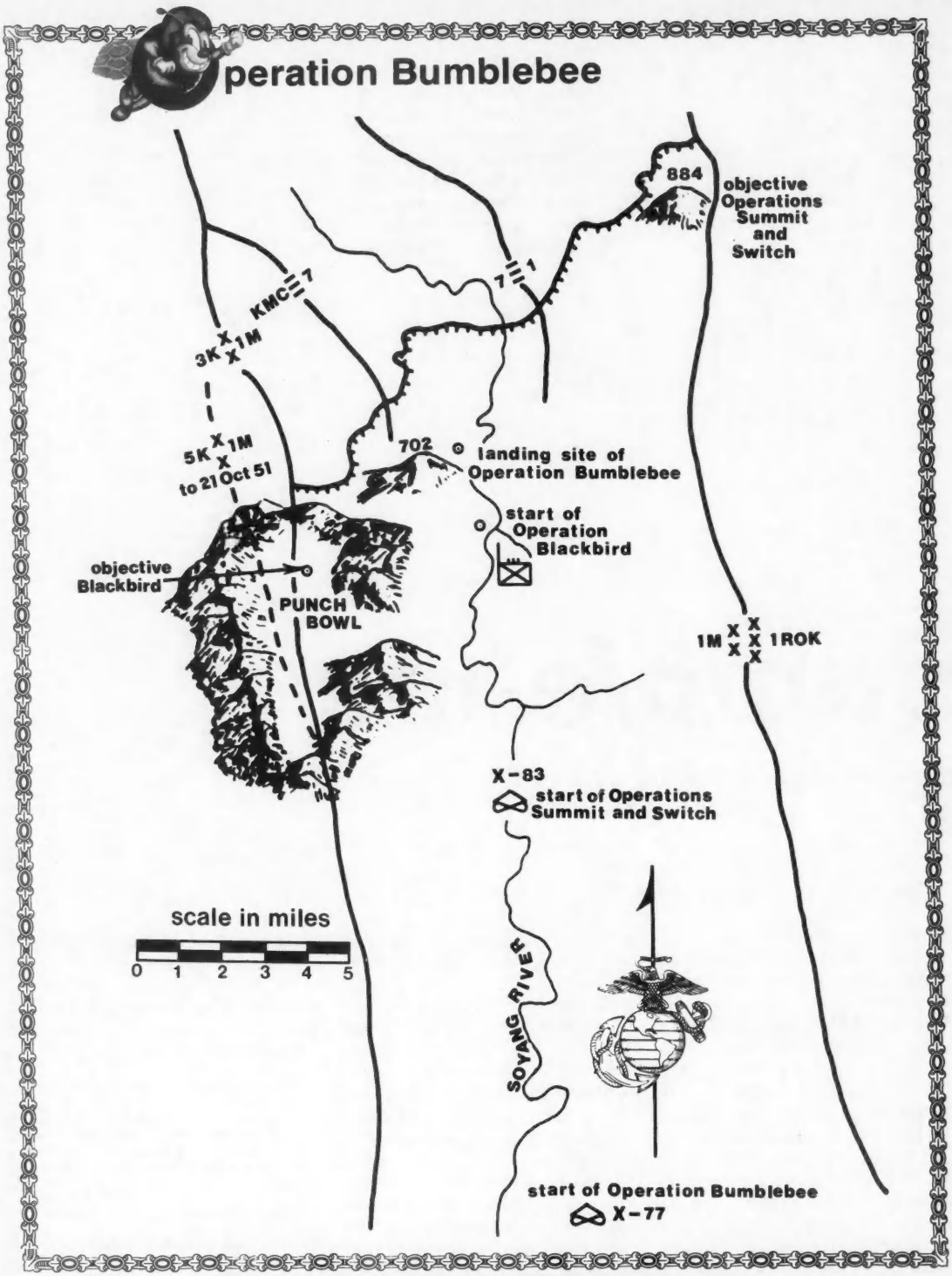
[1] Robert Mason, *Chickenhawk* (Penguin Books, 1984), p. 47.

[2] Lynn Montross, Major Hubard D. Kuokka, and Major Norman W. Hicks, "The East-Central Front," *U.S. Marine Operations in Korea, 1950-1953*, Volume IV, pp. 164, 187-188.

[3] *U.S. Marine Operations in Korea, 1950-1953*, p. 164.

[4] *U.S. Marine Operations in Korea, 1950-1953*, p. 188.

[5] *U.S. Marine Operations in Korea, 1950-1953*, p. 165.



Marine Helicopter Transport Squadron, HMR-161, operations in 1951.

Sikorsky HO3S-1 (R-5).

tion on the main line of resistance (MLR) on 12 September. By dawn, two of the battalions had changed over, and the 1st and 3d were on their way to the reserve station at Wontong-ni. The 2/7 Marines, however, were stuck in the middle of North Korean positions, and one company was separated from the other two. The 1st Marines were ordered to attack to get them out. The attack of the 1st Marines, originally scheduled for 0500 hours on 13 September, had been changed to 0900 hours by division orders. The advance was stalled because of ammunition shortages, mounting casualty lists and shortage of HTL-4s for evacuation of casualties. Enemy guerrilla interdiction of roads added to the logistical difficulties.[6]

Operation Windmill I would lift 1 day's supplies to 2/1 Marines over a distance of 7 miles. Loading commenced at 1520 hours on 13 September. At 1540 hours, four HRS-1 aircraft left to carry the landing point section, which was a detachment from the 1st Shore Party Battalion. At 1600 hours, seven HRS-1 aircraft departed with supplies suspended by cargo nets.

The route followed valleys as much as possible to provide cover (the first helicopter nap-of-the-earth in combat). The 11th Regiment (the artillery regiment for the 1st Marine Division) laid down smoke for concealment. The landing point section cleared a 20 by 40 foot landing zone and marked it with fluorescent panels. At 1610 hours, the first HRS-1 hovered in and released its cargo net. A few minutes later it took off with five walking wounded and two litter cases. Each return flight carried as many wounded as possible, depending on the amount of fuel in its tanks.

In 2½ hours, 15 aircraft lifted 18,848 pounds of cargo and evacuated 74 casualties. Windmill I was so successful that Windmill II was conducted on 19 September 1951.[7]

First Movement of Troops

Operation Summit was the first ever movement of troops in combat by helicopter. It took place just 2 days after HMR-161 had completed Windmill II.

The 1st Marine Division had been directed to extend the X Corps boundary eastward by taking over the sector of the 11th Regiment, 1st Army of the Republic of Korea (ROK) Corps. This included the key terrain surrounding Hill 884 (see map), which dominated enemy-held terrain, but which was only accessible on foot. The commanding general of the 1st Marine Division, Major General Gerald C. Thomas, decided that a reconnaissance of this area was essential. He assigned this mission to the division reconnaissance company after deciding on a troop lift by helicopter. The 2 days between Windmill II and Summit were used to formulate the plan, complete assignment and loading tables, and conduct a rehearsal.

The plan called for the clearing of two landing sites on Hill 884 by a landing point team from the 1st Shore Party Battalion. Each landing site was secured by a preliminary landing of a reconnaissance company rifle squad. Both of these groups had to disembark from hovering helicopters by means of knotted 30-foot ropes. As soon as the two landing sites were cleared (about 40 minutes), word was transmitted by radio for the loading to begin at Field X-83 (see map) about 14 miles southwest.

Voice contact could not be established between the landing point team

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[6] Edwin P. Hoyt, *The Bloody Road to Panmunjom* (Stein and Day, 1985), p. 248.

[7] *The Bloody Road to Panmunjom*, pp. 186-190.

peration Bumblebee

and X-83, so one helicopter orbited at the landing site to be used for communications with incoming aircraft. Two radio nets maintained communications between the landing sites and incoming aircraft. Aircraft landed at 30-second intervals, each carrying 5 fully equipped men who disembarked in an average time of 20 seconds.

In an overall time of 4 hours, 224 men, including a heavy machinegun platoon from 2/7 Marines, was lifted in to the position. In addition, HMR-161 carried in 17,772 pounds of cargo. Operation Summit ended with helicopters laying two telephone lines between the reconnaissance company on Hill 884 and the 1st Marine Regiment command post about 8 miles to the rear.

Operation Blackbird

The 1st Marine Division's east flank was now secure and attention was turned to consolidating the other flank, northwest of the Punchbowl, where the Marines' sector joined that of the 5th ROK Division. The two sectors were divided by high, roadless mountains. In an emergency, there would be no way to move reserves rapidly to this sensitive area other than by helicopter. Since a surprise attack was most likely to occur at night, it was decided that a helicopter lift of an element of the division reserve should be made in the darkness of 27 September after a detailed daytime rehearsal.

Between the 21st and the 27th of September, the commander of HMR-161, Lieutenant Colonel George W. Herring, sent his crews on night indoctrination flights. These flight were to get them accustomed to night flying with the primitive instrumentation and to memorize terrain features.

Operation Blackbird commenced at 1930 hours on 27 September. The aircraft took off from a dry river bed southeast of Hill 702 (see map). The movement was only 5 miles in distance, but the route included detours necessary for concealment so a round trip was about 13 miles. The landing site was near the northwestern rim of the Punchbowl. From there the troops were to march a mile to their final assembly area.

The night was dark when the first HRS-1 took off with five combat equipped men. Three-minute intervals were required between aircraft operating on a shuttle system, so as to avoid the danger of collisions. Different altitudes were assigned to outgoing and incoming traffic, and aircraft used running lights only 2 minutes before entering or after leaving the landing site.

A total of 223 troops were landed in 2 hours and 20 minutes instead of the 9 hours, which a movement by foot would have required. Not everything went right with the movement, however. Rotor wash blew out many of the flare pots lighting the loading area, and the battery-powered beach lanterns on the landing site proved to be inadequate. Pilots were temporarily blinded by the glare on their Plexiglas windshields. Artillery flashes bothered them while they made their way through three different mountain passes. Fortunately, good radio communications aided pilots who had trouble in locating the landing site despite the night rehearsals.

Operation Blackbird remained the only night helicopter troop lift during the Korean War. The Marine report of the operation concluded that "night troop lifts in mountainous terrain are feasible if a daylight reconnaissance of the landing zone together with the avenues of approach and retirement can be effected. Present equipment indicates that, under present conditions in Korea, these night lifts should be limited to movements within friendly territory."[8]

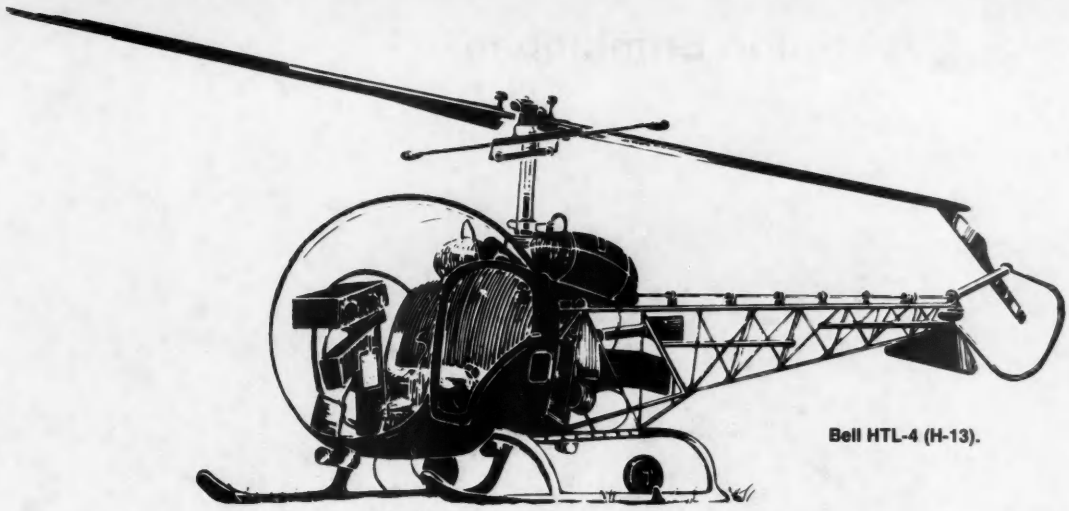
Operation Bumblebee

The 1st Marine Division commanding general, Major General Thomas, had figured prominently in the Marine helicopter development program since the HMX-1 days at Quantico. Bolstered by the achievements and successes of the previous month, at the end of September he and his staff determined that the movement of a battalion should be the next practical step. On 8 October 1951, a warning order was issued to the 3d Battalion, 7th Marines, to move by airlift to relieve a battalion of the 5th Marines on the MLR.

The primary purpose was to acquire planning experience in determining time factors involved in a tactical movement of this size. A secondary purpose was the speeding up of the relief and the reduction of demands on motor transportation.

The new commander of the 3/7 was Lieutenant Colonel Edwards, who had previously been commander of the 1st Shore Party Battalion and had helped train its landing site and loading point teams. He took part in the planning along with staff officers from regiment and division. The HMR-161's Lieutenant Colonel Herring and the new commander of the 1st Shore Party Battalion, Lieutenant Colonel Pafford, also took part.

Planning was conducted as if for an amphibious operation. The assignment and loading table for the HRS-1 aircraft was modeled after that of a landing boat assignment table. Each man was to have his assigned place in the cabin of the helicopter so that loading and unloading could be completed with the least delay and confusion. On 10 October, all officers and noncommissioned officers of 3/7 attended a familiarization class conducted at air-



Bell HTL-4 (H-13).

field X-77 during which trial teams were loaded.

Field X-77 was selected as the loading site because of the proximity to the assembly area of the 7th Marines. The landing site was just behind the 5th Marines MLR, northeast of Hill 702. The flight path of 15 miles, though longer than necessary, took advantage of the concealment from enemy observation provided by valleys and defiladed areas. From 10 to 12 minutes were required to cover the distance.

Operation Bumblebee began at 1000 hours on 11 October. The dispatchers at the two loading zones, designated RED and WHITE, had a checkoff and flight list containing the names of each six-man team to be loaded. The men went first to the standby box to await their turn at the ready box. If a team was found short, a replacement could be called immediately from a casual pool made up of extra troops from headquarters company.

As the helicopters landed at intervals of 1 minute, a team could exit and allow the craft to be airborne in an average time of 17 seconds. "Time was saved," according to one Marine report, "when the shore party personnel, after opening the door, vigorously assisted the passengers by grasping their arms and starting them away from the craft. The last man out checked to see if any gear had been forgotten. Guides furnished by the battalion directed the passengers toward their respective company assembly areas, thus keeping the landing areas clear at all times."[9]

Twelve helicopters were employed in 156 flights, taking 5 hours and 50 minutes to move 958 combat-equipped troops.

Considering the lack of experienced personnel, coupled with tactics and techniques that were previously untried in combat, the Marines participating in these operations did an amazing job. The one factor that seems to have helped them the most was that the missions were planned and conducted almost exactly like amphibious assaults, which the Marines were thoroughly accomplished at conducting. They were accustomed to embarking in a safe area and debarking in a hostile area without much confusion.

The Future of Helicopter Warfare

The fall of 1951 was a key period in the history of military aviation. The HMR-161 continued to support ground operations by moving supplies and troops, and by evacuating wounded. Newspaper correspondents were quick to sense that tactical history had again been created.

The Marine Corps even experimented with helicopters as artillery support: HRS-1 helicopters were used to carry 4.5-inch rocket launchers to forward positions along the MLR. The launcher was carried externally with a small crew inside the cabin. Upon arrival at the MLR, the pilot set the launcher down, disconnected the hook, then landed for the rocket launcher crew to exit. The helicopter waited a short distance away, while the launcher crew fired the rockets across the MLR. Then

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[8] Quotation from Type "C" Special Report, "The Employment of Assault Helicopters," Part II, 4, as quoted in *Cavalry of the Sky* (Harper & Brothers), Lynn Montross, p. 167.

[9] Quotation from Type "C" Special Report, "The Employment of Assault Helicopters," Part II, 5-9, as quoted in *U.S. Marine Operations in Korea, 1950-1953*, p. 214.

Operation Bumblebee

The ease of loading casualties onto the outboard litters made the Bell HTL-4 better for medical evacuations.

the sling ropes were reconnected, the launcher crew boarded and the aircraft departed. The elapsed time was less than 5 minutes.

This method of employing the 4.5-inch rocket launcher proved to be superior to ground employment because the short range of the rocket launcher dictated that it be employed close to the MLR. Also, the launching kicked up so much dust and debris that enemy spotters were able to identify the location of the launcher. The helicopter moved the launcher and crew away faster than counterbattery fire could be delivered.[10]

The Army was slow to realize the tactical advantages that could be offered by use of helicopters for more than just evacuation of wounded. In April 1953, 1½ years after Operation Bumblebee, the 6th Transportation Helicopter Company presented two demonstrations to General Maxwell Taylor and the ground commanders from throughout the theater. One demonstration used 13 H-19s to airlift 597 combat-equipped troops and 19,700 pounds of equipment to the 40th Infantry Division during a 40-minute exercise.[11] Despite the favorable impressions that these demonstrations created, the Army continued to use helicopters mostly for casualty evacuation throughout the rest of the war, relying on its fleet of small fixed wing aircraft to perform liaison and artillery spotting missions.

Finally on 15 May 1953, the 6th Transportation Helicopter Company moved a complete ROK artillery battalion in the X Corps area to a new position behind the front lines. The company moved 480 soldiers and 14,000 pounds of cargo in 2 hours, saving a 5-day road march.[12] The seeds of today's air assault tactics had been planted.

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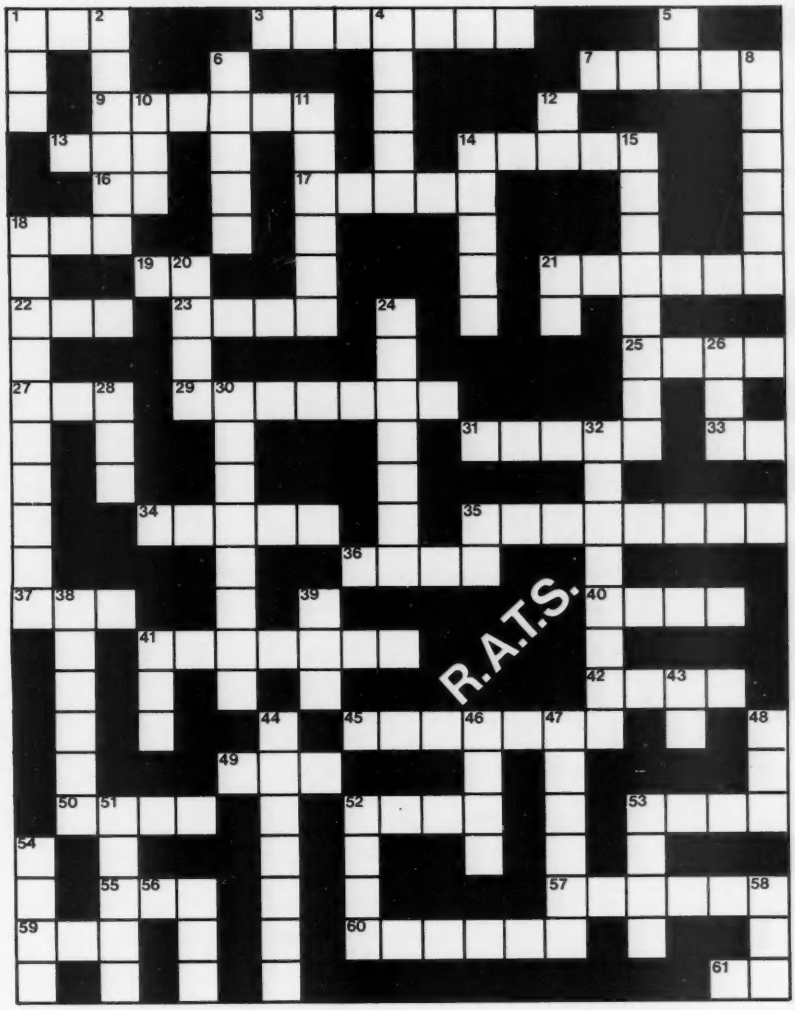
[10] Richard K. Tierney, who as a young Marine in the 3/7 participated in Operation Bumblebee and who witnessed this technique of weapons employment while fighting along the MLR.

[11] Dario Politella, *Operation Grasshopper* (The Robert R. Longo Company, 1958), pp. 163-164.

[12] *Operation Grasshopper*, pp. 165-166.

THREAT QUIZ

THIS THREAT related crossword puzzle was developed by CW2 Tim Roderick, the aviation threat officer of the 1st Battalion, 101st Aviation Regiment, 101st Airborne Division (Air Assault), Ft. Campbell, KY. CW2 Roderick developed the puzzle as part of his unit's R.A.T.S. threat training program (real aviator threat system). Answers are on page 15.



ACROSS

1. PRC army
3. SH 60
7. Japanese Phantom
9. British ADA msl
13. Long distance arty rd
14. Soviet Fox-2, heat-seeking msl
16. Military Intelligence
17. W. German recon vehicle
18. British Special Forces
19. _ _-8 Gecko
21. SA-13
22. Colt
23. Mi-24
25. Soviet antitank wpn
27. Electronic countermeasures
29. Norwegian designed ASM adopted for 3 across
31. Launch vehicle for 35 across
33. Soviet sidearm
34. SA-4
35. AT-5
36. Ground-launched cruise msl
37. _ _ _ K, Soviet HMG
40. Soviet 10-ton truck
41. British swingwing A/C
42. Most modern Soviet tank for export
45. Israeli MBT
49. Soviet military intel
50. British antitank helo
52. Israeli designed future fighter
53. IL 20
55. Soviet amphibious tracked transport
57. French-Italian SSM/antiship msl
59. Sagger
60. AT-3
61. RPU-_ _ towed rocket launcher

DOWN

1. Arafat's bunch
2. M-1
4. Mi-28
5. _-_ Skyhawk
6. European infantry ATGM
8. W. German tank destroyer
10. Bullets that go through armor and burn
11. W. German and New Mexico National Guard ADA msl
12. _ _ -105, PAH-1
14. Soviet airborne armored gun
15. W. German 120 mm MBT
18. Soviet SS-12 SSM
20. OH-58D
21. W. German issue rifle
24. SA-6
26. Soviet ferry
28. U.S. 7.62 GPMG
30. Aircraft that sank British ship *Sheffield* during the Falklands War
32. Italian ATK helo, Mongoose
35. Servicemember (abbr)
38. AT-6
39. Goa
41. Soviet MBT w/115 mm main gun
43. Sikorsky AH/H- _ _ Eagle
44. SA-14
46. Israeli fighter A/C
47. Soviet submarine class
48. European TOW-type wpn w/400 m range
51. Forger
52. W. German 110 mm rocket launcher
53. AN-14
54. _ _ _ _ face USSR EW radar for SA-2,3,6,8 and S-60
56. Aardvark F-_ _ _
58. Soviet MBT that allows tank cmdr to fire HMG from inside tank

ATC FOCUS

U.S. Army Air Traffic Control Activity

ATC MAINTENANCE UPDATE

Mr. Neal Johnson
Area Maintenance Facility
U.S. Army Air Traffic Control Activity
Fort Rucker, AL

The AN/GRT-21/22 Modulation Percentage Alignment using Crystal Mixer

Confusion has existed for years, throughout the air traffic control (ATC) technical force, as to the proper procedure for modulation percentage alignment. The Signal School at Ft. Gordon, GA, has always taught alignment using a crystal mixer; however, few installations have this equipment.

In an attempt to standardize ATC maintenance procedures, ordering information and alignment procedures for equipment required to accomplish this alignment are as follows:

ORDERING INFORMATION

- Coaxial crystal mixer, national stock number (NSN) 5985-00-087-4714, part number (PN) 10658140, federal supply code for manufacturer (FSCM) 15542, price $34.53.
- Detecting element, NSN 6625-01-080-5452, PN 4274-025, FSCM 70998, price $61.90.

ALIGNMENT PROCEDURES

- Connect the AN/USM-298 (Bird 43) wattmeter, with the above detecting element installed, to K1J3 of exciter.
- Connect output of wattmeter to dummy load or antenna.
- Connect output connector of detecting element to "L" connector of crystal mixer.
- Connect "X" output of crystal mixer to oscilloscope.
- Tune a signal generator radio frequency (RF) output frequency to a frequency that, when subtracted from the exciter carrier frequency, will produce a frequency within the range of the oscilloscope being used. The RF out signal will be connected to "R" connector of the crystal mixer. If an AN/USM-281 scope is used, the signal should be below 60 megahertz (MHz), if an AN/USM-475 oscilloscope is used, the signal is below 100 MHz. The signal generator is used to inject 1,000 hertz modulation signal.
- Adjust modulation percentage as prescribed in the technical manual (TM) using the Emin or Emax (minimum or maximum volts) formula.

Replacement Universal Heads for Dictaphone 4000

The Dictaphone Corporation has introduced replacement universal heads for all 8- and 10-channel recorders and reproducers. The following are the new PNs and the PNs of the heads to be replaced.

8 CHANNEL

PNs 400141 and 400142, 4-track record replaced by PN 420958 record head kit.
PNs 400181 and 400182, 4-track play replaced by PN 420959 play head kit.

10 CHANNEL

PNs 400143 and 400144, 5-track record replaced by PN 420939 record head kit.
PNs 400183 and 400184, 5-track play replaced by PN 420938 play head kit.

There is a space problem with time on 8-channel machines. On these machines, use the contact pins to connect the leads together. The contact pin terminal board is not used. Place tubing over the connection. Another consideration for 8-channel recorders is, if the erase head is replaced with the wider erase head, the following actions must be taken:

- Replace bias transformer, PN 400001, with PN 400701.
- Replace the capacitor, NSN 5910-00-054-5975, with NSN 5910-00-481-9164.
- Add capacitor C-21, NSN 5910-00-106-5049, in series with terminal 6 of bias transformer and one side of erase head. See TM 11-5835-247-34, "Direct Supervision, Ground Supervision Maintenance Manual Recorder, Sets Sound," foldout number 9.
- Adjust bias per TM 11-5835-247-34, chapter 3.